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(54) [Title of Invention]
FLUORESCENCE DIAGNOSING APPARATUS

(57) [Abstract]
[Purpose]
To provide a fluorescence diagnosing apparatus capable of measuring the fluorescence spectrum of a diseased area without causing bleeding and performing the biopsy on a diseased tissue more reliably by an endoscope.

[Constitution]
Cups 7a and 7b for biopsies, which can be inserted to the channel of an endoscope, are provided at the tip of an elongated coil sheath 14 and can be opened/closed by controlling an operating part on the handle side via an operating wire 11. The end surface 3A of optical fibers 3 attached to the base of the cups 7a and 7b is inserted in the coil sheath 14, and the rear end is connected to an analyzer 4 to transmit an excitation light from a laser 17. When the cups 7a and 7b are opened, the excitation light irradiates a tissue to be targeted from the end surface 3A and fluorescence from the target tissue are taken in and input in a spectrometer 18 which separates into a spectrum. Based on the analysis of the spectrum waveform by a computer 5, whether or not the tissue is normal or diseased is discriminated and the result is displayed on a color monitor 6.

[Claim]
[Claim 1]
A fluorescence diagnosing apparatus which comprises:
a biopsy forceps having:
an elongated insertion part which can be inserted in the channel of an endoscope for observing organs in a body cavity,
cups for collecting tissue provided at the distal end of the aforesaid insertion part which can be opened and closed, an operating part for controlling the opening/closing of the aforesaid cups which is provided on the handle side of the insertion part,
optical fibers which are installed inside the aforesaid insertion part and its emission end is placed near the base of the aforesaid cups to irradiate the transmitted excitation light to a target tissue and pick up fluorescence from the tissue when the aforesaid cups are in the open state;
a light source apparatus by which the excitation light is incident to the aforesaid optical fibers;
a spectrometer for detecting the aforesaid fluorescence via the aforesaid optical fibers and disintegrating it into a spectrum;
an analyzer for analyzing the aforesaid spectrum and diagnosing the characteristics of the target tissue; and

a display device for displaying the analysis information from the aforesaid analyzer.

[Detailed Description of the Invention]
[0001]
[Technical Field of the Invention]
This invention relates to a fluorescence diagnosing apparatus which irradiates light by an endoscope and observes a lesion such as a cancer and performs a biopsy based on autofluorescence from the target tissue.

[0002]
[Prior Art]
In recent years, techniques such as autofluorescence, which is generated directly from living tissue by irradiating the excitation light to an observation area of living tissue, and drug-induced fluorescence, which is generated by injecting a fluorescent drug into the organism beforehand, produce two-dimensional images which are used to diagnose the degeneration of tissues of the organism or a state of the disease (for example, the type of the disease or the extent of infiltration), such as a cancer. These techniques are disclosed in the United States Patent Numbers 4556057 and 5042494.

[0003]
If excitation light irradiates living tissue, the wavelength of the fluorescence generated will be longer than that of the excitation light. Fluorescence substances in the organism are, for example, collagen, NADH (nicotinamide adenine dinucleotide), FMN (flavin mononucleotide), pyridine nucleotide, etc. Recently, the interrelation between these substances in the organism emitting fluorescence light and diseases is becoming clear, and the diagnosis of cancer, etc. is possible from this fluorescence.

[0004]
A technique for diagnosing lesions by fluorescence using an endoscope is filed in the Unexamined Japanese Patent Number H5-304427 by the same applicants. This device creates an image using the difference of spectrum between a normal tissue and an abnormal tissue in autofluorescence emitted from the tissue irradiated with the 442nm-blue excitation light. In this prior art, images in the green region and the red region of autofluorescence are compared and calculated and a cancerous tissue is displayed in a pseudo color.

[0005]
The method for removing the tissue of a lesion such as a cancerous tissue, which is determined by autofluorescence and fluorescence from HpD, is disclosed in the unexamined Japanese Patent H06-38967. In this prior art, optical fibers are installed in a scalpel or a biopsy needle to diagnose and remove a metastasis of a cancer during the operation.

[0006]
[Problems to be Solved by the Invention]
The method for resecting a tissue according to the fluorescence spectrum at the time of abdominal operation is disclosed. However, in this prior art, the device does not use an endoscope to measure the spectrum of a tissue and perform a biopsy of the tissue. Moreover, in the prior art, an optical probe is attached at the tip of a scalpel or a biopsy needle. At the abdominal operation, the excision can be performed after a spectrum is measured by slightly pressing a tissue with the aforesaid scalpel or biopsy needle; however, when a scalpel or a biopsy needle is inserted through an endoscope, there are some cases that it may be accompanied with bleeding by a scalpel or a needle.

[0007]
In the fluorescence measurement, especially hemorrhage becomes a noise. Since hemoglobin in blood has the strong absorption of light, it is conceivable that fluorescence cannot be detected.

[0008]
This invention is formed in consideration of the above-mentioned issue and it is aimed to provide a fluorescence diagnosing apparatus capable of measuring the fluorescence spectrum of a diseased area without causing a bleeding and performing the biopsy of a diseased tissue more reliably using an endoscope.

[0009]
[Means and Operation to Solve the Problems]
A fluorescence diagnosing apparatus which comprises:
a biopsy forceps having:

an elongated insertion part which can be inserted in the channel of an endoscope for observing organs in a body cavity,
cups for collecting tissue provided at the distal end of the aforesaid insertion part which can be opened and closed, an operating part for controlling the opening/closing of the aforesaid cups which is provided on the handle side of the insertion part,
optical fibers which are installed inside the aforesaid insertion part and its emission end is placed near the base of the aforesaid cups

to irradiate the transmitted excitation light to a target tissue and pick up fluorescence from the tissue when the aforesaid cups are in the open state;

a light source apparatus by which the excitation light is incident to the aforesaid optical fibers;
a spectrometer for detecting the aforesaid fluorescence via the aforesaid optical fibers and disintegrating it into a spectrum;
an analyzer for analyzing the aforesaid spectrum and diagnosing the characteristics of the target tissue; and
a display device for displaying the analysis information from the aforesaid analyzer.
Before causing bleeding, by opening the cups, an excitation light can be irradiated from the distal end of optical fibers to a target tissue and fluorescence from the tissue can be picked up. Thus, the target tissue can be determined whether it is a diseased area or a normal area based on the analysis of the spectrum waveform of fluorescence detected. Therefore, the biopsy on a diseased tissue can be performed more reliably since the biopsy is performed only on an area with high possibility of a disease according to the result of judgement.

[0010]
[Embodiment]
Hereafter, embodiments of this invention will be explained more specifically referring to drawings. Fig. 1 is a fluorescence diagnosing apparatus 1 of a first embodiment of this invention. The fluorescence diagnosing apparatus 1 of the first embodiment employs a forceps provided with the biopsy function and optical diagnostic function. More specifically, it utilizes the biopsy forceps which is provided with an optical probe.

[0011]
A fluorescence diagnosing apparatus 1 of the first embodiment as shown in Fig. 1 comprises:
a biopsy forceps with the optical diagnostic function 2 which has the function to perform biopsies of a target tissue while judging the characteristic/state of the tissue;
an analyzer 4 for detecting fluorescence from the target tissue as well as supplying excitation light to optical fibers 3 which are installed inside the biopsy forceps with the optical diagnostic function 2;
a computer 5 which distinguishes the state of a tissue (a cancerous tissue, or a polyp, or a normal tissue) by analyzing the data from the analyzer 4;
a color monitor 6 as a display means for displaying the result;
an endoscope, which is not illustrated, having the channel for inserting the aforesaid biopsy forceps with the optical diagnostic function 2; and
peripherals such as a light source for supplying illumination light to an endoscope).

[0012]
The aforesaid biopsy forceps with the optical diagnostic function 2 is provided with the biopsy part, which is formed by a pair of cups 7a and 7b at the tip of the elongated forceps insertion part, which to be inserted in the channel of the endoscope, for picking up a tissue to be examined. An operating member 10 provided with a finger hook 9 for opening/closing the aforesaid cups 7a and 7b and a slider for operation 8 for the operating member 10 are formed on the operating part at the rear end of the forceps insertion part.

[0013]
Then, in order to operate (open/close) the aforesaid cups 7a and 7b by interlocking with the movement of the aforesaid slider for operation 8, a wire 11 for transmitting the power is inserted in the forceps insertion part. The rear end of the wire 11 is fixed on the slider for operation 8 and the tip of the wire 11 is connected to the cups 7a and 7b via links 12a and 12b and a splice part 13 by which the link mechanism are formed.

[0014]
The aforesaid forceps insertion part is formed with, for example, a coil sheath 14 by close-wound coil and in which the wire 11 and the optical fibers 3 are inserted through so that the insertion part is protected and bendable by the coil sheath 14. The rear end of the coil sheath 14 is fixed to the tip of a sheath fixed member 15 having a branch which branches off diagonally to the rear. The operating member 10 is provided with the finger hook 9 at the rear of the sheath fixing member 15, and the slider for operation 8 which is fixed at the rear end of the wire and can slide against the operating member 10 is provided.

[0015]
In addition, the optical fibers 3 are passed through the hole of the junction part, which diagonally branches off toward the rear direction of the sheath fixing member 15, and come out of the rear end and connected to the analyzer 4 via a connecting cable 16.

[0016]
The aforesaid analyzer 5 contains a laser (apparatus) 17 for a light source to excite tissue for fluorescence and a spectrometer 18 to separate fluorescence from tissue into a spectrum. When the connecting cable 16 is connected, the end surface of optical fibers 3 is faced to the laser 17 and a dichroic mirror 19 is

arranged on the optical path to separate a laser beam and fluorescence so as to transmit the laser emitted from the laser. After reflected by a dichroic mirror 19, the fluorescence transmitted by the optical fibers 3 is incident to the spectrometer 18 on the opposite side via a filter 20 for blocking excitation light. The aforesaid laser 17 comprises, for example, a He-Cd laser. The He-Cd laser generates a laser light of a wavelength at 442nm as excitation light.

[0017]
In this embodiment, an apparatus is characterized by having the structure as follows. The distal end side of the optical fibers 3, which is built in the biopsy forceps with the optical diagnostic function 2, is installed in a way that the end surface 3A of the optical fibers 3 is attached to the base of cups 7a and 7b. In this condition, when the cups 7a and 7b are opened, the end surface 3A of the optical fibers 3 is exposed. Then, excitation light from the end surface 3A can be irradiated to a tissue where the biopsy is performed and fluorescence from the tissue can be picked up. (In other words, fluorescence observation can be performed before accompanied with bleeding by biopsy treatment.)

[0018]
Next, operation will be explained. First, the biopsy forceps with the optical diagnostic function 2 is introduced to a body cavity through the channel of an endoscope, which has already inserted in the body cavity of the organism (not illustrated). The cups 7a and 7b, which are located at the distal part of the biopsy forceps with the optical diagnostic function 2, are brought near the tissue which appears to be diseased and the slider for operation 8 is slid to the opposite direction of the finger hook so as to open the aforesaid cups 7a and 7b. Then, the end surface 3A of the optical fibers 3 on the base of the cups 7a and 7b is made to contact with the tissue while keeping the cups 7a and 7b open.

[0019]
At this time, excitation light from the laser 17 is incident to the optical fibers 3 to irradiate the tissue. Autofluorescence from the tissue is received by the aforesaid optical fibers 3 and reflects fluorescence by the dichroic mirror 19, and it is incident to the spectrometer 18 after blocking the excitation light by the filter 20. That is, the aforesaid dichroic mirror 19 transmits excitation light and reflects fluorescence having wavelengths longer than that of excitation light.

[0020]
The fluorescence is separated into a spectrum by the spectrometer 18, and the spectral intensity is sent to the computer 5. While calculating the intensity of spectral waveform in the entire fluorescence wavelengths, the computer 5 analyzes the spectral intensities of two wavelengths that show the distinct difference between a normal area and an abnormal area such as a lesion. Then, the analysis result of the tissue (diseased or normal) is displayed on the color monitor 6. The operator can perform the biopsy treatment (which is accompanied with bleeding) on the tissue based on the analysis of a high possibility of a lesion. Thus, the biopsy of a diseased tissue can be performed reliably and the pain for a patient can be reduced since there is no need to perform excessive biopsies from many areas.

[0021]
According to this embodiment, the following effect can be obtained. A tissue to be observed can be judged for whether or not it is normal or not before causing bleeding by the biopsy treatment. Therefore, the environment for more reliably performing the biopsy of a diseased tissue can be realized.

[0022]
Next, a fluorescence diagnosing apparatus of a second embodiment which performs fluorescence diagnosis by an endoscope without using a biopsy forceps is explained referring to Fig. 2. Apparatuses in Fig. 2 through Fig. 4 are equipped with an auxiliary light source means or a function of an auxiliary light source. First, the background of this embodiment will be explained.

[0023]
In a prior art, an excitation light source and a high sensitive camera are connected to an endoscope for fluorescence observation, and a white light source and a camera (for white light) are connected for normal observation. Since weak fluorescence was detected for fluorescence observation, an endoscope was made closer to tissue. However, when an endoscope was inserted in an open space such as the stomach, the eyepiece was far from the tissue and an image became dark so that an orientation was difficult. When a tissue bleeds, an image also became dark because of the light absorption.

[0024]
Thus, the purpose of this embodiment is to realize an excellent orientation even in such cases by enabling imaging by reflected light without changing the conditions (such as the sensitivity of a camera, the intensity of a laser) of fluorescence observation.

A fluorescence diagnosing apparatus with an auxiliary light source means to achieve this purpose is structured as below.

[0025]
A fluorescence diagnosing apparatus 21 of the second embodiment shown in Fig. 2 comprises:
a light source apparatus 24 provided with a laser 22 for exciting (tissue to emit) fluorescence and a laser diode (hereafter, abbreviated to LD) 23 as an auxiliary light source for fluorescence observation;
an endoscope 27 provided with a light guide 25 for irradiating light to a body cavity from the aforesaid light source apparatus 24 and an image guide 26 for transmitting fluorescence and reflected light as a two-dimensional image;
a camera 28 for converting a fluorescence image and a reflected light image acquired by the aforesaid endoscope 27 into video signals;
a processing apparatus 29 for processing the aforesaid video signals; and
a color monitor 30 as a display device.

[0026]
The light source apparatus 24 comprises:
the laser 22 which generates excitation light;
the LD 23 which generates illumination light for capturing an image by a reflected light; a driver 31 for operating the LD 23;
a controller 32 for controlling the aforesaid driver 31 and the laser 22;
lenses 33, 34, 35, and 36 for introducing these light to the light guide 25; and
a dichroic mirror 37 as a combining means to combine light by passing through or reflecting the light from the laser 22 and light from the LD 23.
The aforesaid laser 22 contains such as a He-Cd laser which generates a laser light of a wavelength at 442nm as excitation light.

[0027]
The aforesaid endoscope 27 has:
an elongated insertion part 41 which can be inserted into a body cavity 38;
an operating part 42 provided at the end of the insertion part 41;
an eyepiece part 43 provided at the end of the operating part 42; and
a light guide cable 44 extended from the side of the operating part 42.
The connector 45 at the end of the light guide cable 44 is detachable to the light guide apparatus 24.

[0028]
The light guide 25 is inserted in the insertion part 42 and that rear side is inserted in the light guide cable 44. By connecting the connector 45 to the light source apparatus 24, the laser light from the laser 22 is supplied to the end surface of the light guide 25. This laser light as excitation light irradiates the tissue 47 from the distal side of the insertion part 41 via an illumination lens 46 for diffusing light.

[0029]
An observation port is provided next to the illumination window where the illumination light 46 is attached and an objective lens 48 is attached to the observation port so that an image of the tissue 47 irradiated with the laser light is formed onto the image formation position. The distal end of the image guide 26 is arranged at this image formation position and this image is transmitted to the rear surface of the eyepiece part 43. The ocular lens 49 is located to face the rear surface of the eyepiece part 43. The detachable camera 28 can be mounted to the eyepiece part 43.

[0030]
The camera 28 contains:
an excitation-light blocking filter 50 which is arranged across from the aforesaid ocular lens 49 for blocking an excitation light for exciting (tissue to emit) fluorescence;
a lens 51 for forming an image through the excitation-light blocking filter 50;
a rotatable filter 52 which has several filters 52a (Fig. 2 shows only one filter 52a in the optical path.) for passing through specific wavelengths of fluorescence;
a motor 53 for rotating the rotatable filter 52 so that several filters 52a of the rotatable filter 52 are switched and arranged in the optical path;
an image intensifier 54 for amplifying fluorescence which passed through the filter 52a of the optical path; and
a CCD 55 for electrically converting images by fluorescence amplified by the image intensifier 54 into video signal.

[0031]
The aforesaid processing apparatus 29 consists of a timing controller 56, which controls the drive of the aforesaid motor 53 to switch filters 52a, and an image processor 57 which processes images of a lesion in order to observe a lesion easily. The image processor 57 also performs signal processing of the images captured by the CCD 55 via the rotatable filter 52 to display them in pseudo color as a color component image at the time of orientation (when the LD 23 emits light).

[0032]

In addition, the light emission by the LD 23 can be controlled by the technician at the time of orientation such as confirming or positioning of the location of an observed area. More specifically, by operating such as a switch, the LD 23 can be independently turned on and off (light on or off) to excitation light.

[0033]
The light of the LD 23 is also matched to fluorescence in specific wavelengths (for example green and red wavelengths) extracted by the filter 52a attached to the rotatable filter 52. The illumination intensity of the LD 23 is low. The illumination intensity of a light source is low as a reflected light, which has equal intensity as the specific fluorescence transmitted by the filter 52a of the rotatable filter 52, entering the filter 52a at the time of orientation.

[0034]
Operation will be explained next. For fluorescence observation, a laser light, which has a wavelength to become excitation light, from the laser 22 is incident to the light guide 25 of the endoscope 27 via lenses 33, 34, and 35 and diffused by the illumination lens 46 so as to irradiate a body cavity 38. At this time, fluorescence is generated from the tissue 47 and enters the camera 28 via the objective lens 48, the image guide 26, and the ocular lens 49.

[0035]
That is, the excitation-light blocking filter 50 transmits only fluorescence and specific fluorescence is extracted by the filters 52a (for example, a filter for green or a filter for red) attached to the rotatable filter 52, and after amplified to several thousands to several ten thousand times by the image intensifier 54, it is received by the CCD 55.
At this time, the filters 52a are switched by rotating the rotatable filter 52 by the motor 53, and the weighing, etc. is performed on each video signal obtained by each of filters 52a by the image processor 57 to emphasize a lesion. Then, the color monitor 30 displays the images in pseudo color.

[0036]
On the other hand, at the time of orientation, the LD 23 which emits light at a equal wavelength as the transmission intensity of the filter 52a attached to the aforesaid rotatable filter 52 is turned on by the controller 32 and the driver 31, and [the light from the LD 23] is reflected by the dichroic mirror 37 and combined with the light from the aforesaid laser 22.

[0037]
The light is introduced to the endoscope 27 in the same way described above and the reflected light is received by the objective lens 48 and the image guide 26. Since the wavelength of the LD 23 is passed through the excitation light blocking filter 50 and the rotatable filter 52, the image irradiated by the LD 23 is amplified by the image intensifier 54 and received by the CCD 55 as a reflected light image. The state of the body cavity is displayed on the monitor 30 in pseudo color by the image by reflected light. Thus, an orientation can be performed easily by observing the image.

[0038]
Therefore, this embodiment has the following effects. When a fluorescence image becomes dim by having more space or bleeding during the fluorescence observation, a body cavity can be observed without any burn in (damage) to an image intensifier and an orientation can be performed easily by irradiating light with low illumination intensity by a light source such as a LD. In addition, a LED may be employed instead of the LD 23.

[0039]
Modification examples of the embodiment of Fig. 2 are shown in Fig. 3 and Fig. 4. In the examples of Fig. 3 and Fig. 4, a body cavity is irradiated by the light from a laser 22 as the light in the blue region and LDs 48 and 52 [note: should be 58 and 60] as the light in green and red regions, and the reflected light is detected as a RGB video signal. By doing this, it is possible to perform an observation similar to the observation by white light. Fig. 3 illustrates the structure of a light source apparatus 24'. Fig. 4 illustrates the structure of a camera 28'.

[0040]
In the light source apparatus 24' shown in Fig. 3, a LD 58 for emitting light in the green region is used instead of a LD 23 and a dichroic mirror 59 for reflecting the light in the red region and passing through other light is arranged between a lens 36 and a dichroic mirror 37. A LD 60 for emitting light in the red region and a lens 61 are also placed to face the dichroic mirror 59. The LDs 58, 60 are operated by a driver 31 and generates light in low intensity.

[0041]
Since the wavelength of the laser 22 is made as a light in the blue region in this modification, the dichroic mirror 37, which is arranged between a lens 34 and 35, is to transmit blue light and reflect light in longer wavelengths than that of blue light.

[0042]
With this component, it enables that both light of the LDs 58 and 60 are combined by transmitted and

reflected by the lenses 36, 61, and the dichroic mirror 59, and further combined with the light from the laser 22 via the lens 33 and 34 by the dichroic mirror 37, and the light is incident to the light guide 25 after condensed by the lens 35.

[0043]
In addition, a controller 32 is connected to a switch 32a. By turning on this switch 32a, the controller 32 operates the LDs 58 and 60. That is, operation of LDs 58, 60 can be controlled by the switch 32a separate from the light of the laser 22. Other components are the same as that of the light source apparatus 24 in Fig. 2.

[0044]
On the other hand, the camera 28' in Fig. 4 is provided with:
a dichroic mirror 64 for reflecting light in the blue region of the light from the aforesaid laser 22 and passing through light in longer wavelengths;
a dichroic mirror 65 for further reflecting the light in the green region of the light transmitted by the dichroic mirror 64 and passing through light in longer wavelengths;
a CCD 66 for converting an image of the aforesaid blue region into a video signal;
an image intensifier 67 for amplifying the image in the aforesaid green region;
a CCD 68 for converting the image into a video signal;
an image intensifier 69 for amplifying the image in the aforesaid red region; and
a CCD 70 for converting the image into video signal.

[0045]
Lenses 71 - 75 project images from the endoscope 27 on the CCD 66 and the image intensifiers 67 and 69. In addition, filters 76 and 77 respectively transmit specific wavelengths in the green region including the wavelength of the LD 58 and that in the red region including the wavelength of the LD 60.

[0046]
Signals photoelectrically converted by the CCD 66, 68 and 70 are input to the image processor 57 by which an image processing is performed in order to display an image that is easy to distinguish a diseased area at the time of fluorescence observation. At the time of orientation, the output signals of CCD 66, 68, and 70 are considered as image signals for color components and processed to generate a color image so that it is displayed on the color monitor 30.

[0047]
Operation will be explained next. Operation for the fluorescence observation is similar to that of Fig. 2. In the embodiment of Fig. 2,the specific green and red wavelengths are acquired by the rotatable filter; however, specific wavelengths are separated by the dichroic mirror 65 and filters 76 and 77 and each wavelength is respectively received by the image intensifiers 67 (for green) and 69 (for red), and the CCDs 68 (for green) and 70 (for red) in the examples of Fig. 3 and Fig. 4.

[0048]
Then, the same area in the image received by CCD 68 and the image received by CCD 70 are compared. If there is a strong possibility that the area is abnormal like diseased, a color of the area will be changed. At that time, the image is displayed in pseudo color in such a manner that tone of the image is changed or the display color is changed depending on the result of the judgement of a possibility as a diseased area. For example, if the area is determined as normal, the area will be displayed in white. If the area is determined at a certain percentage that the area is possibly diseased, the area of potentially diseased can be observed easily by applying red or green color to the possible diseased area and increasing chroma based on the possibility, etc.

[0049]
On the other hand, at the time of orientation, the user turns the switch 32a on and light is emitted from the LDs 58 and 60 by the driver 31 according to the instruction from the controller 32.

[0050]
The light from the LDs 58 and 60 enters to the light guide 25 with the light of the laser 22 and irradiates organs and such in a body cavity. The reflected light is received by the image guide 26. An image in the blue region is projected onto the CCD 66, an image in the green region is amplified by the image intensifier 67 and projected onto CCD 68, and an image in the red region is amplified by the image intensifier 69 and projected to the CCD 70 by the ocular lens 49, lenses 71-75, dichroic mirrors 64, 65, and filters 76, 77. Each image is processed by the image processing circuit 57 as a RGB signal and displayed on the color monitor 30 in color.

[0051]
In this case, the image is displayed in the condition like the color image detected by white light illumination, thus, the image can be observed in tone that are used for observing white light illumination.

[0052]

These modification examples have the following effect. By irradiating/receiving the primary colors of blue, green, and red, discrimination can be performed in similar colors as colors of white light observation so that an orientation is further improved.

[0053]
Next a third embodiment of this invention will be explained. This embodiment is a fluorescence diagnosing apparatus capable of easily distinguishing a lesion, bleeding area, shadow, etc by displaying both images of autofluorescence and reflected light by excitation light simultaneously. First, the background will be explained.

[0054]
Conventionally, the image of wavelengths in green and red regions of autofluorescence spectrum is recorded at the time of fluorescence observation and displayed by processing between images. An apparatus which standardize a fluorescence image by excitation image is disclosed in the prior art of Patent Number H03-58729.

[0055]
At the time of fluorescence observation, diseased, bleeding, and shadow areas become dimmer than a normal area so that distinguishing among them is very difficult. On the other hand, a method of standardizing a fluorescence image by the reflected light source is proposed as the method to correct various changes of fluorescence by which a diseased area is bright but bleeding and shadow areas are still dark under the reflected light source.

[0056]
If images are standardized in this condition, the areas of bleeding and shadow are standardized in a dark image. Thus, the quality of the areas is poor with lots of noise.

[0057]
Therefore, This embodiment is aimed to provide a fluorescence diagnosing apparatus capable of distinguishing among a diseased area, bleeding area and a shadow. To achieve this purpose, it is structured to distinguish among a lesion and a bleeding area and a shadow easily by displaying both images of a fluorescence image and a reflected light image on the same monitor. Hereafter, the embodiment is explained more specifically referring to Fig. 5.

[0058]
A fluorescence diagnosing apparatus 81 shown in Fig. 5 comprises:

a light source apparatus 82 which contains a laser 22;
an endoscope 27 which contains a light guide 25 for transmitting the excitation light emitted from the light source apparatus 82 to irradiate tissue of a body cavity to be observed and an image guide 26 for transmitting an autofluorescence image and a reflected-light image from the tissue;
a camera 83 which contains image intensifiers 67 and 69 and CCDs 68 and 70 for capturing the aforesaid autofluorescence image, CCD 66 for capturing the aforesaid reflected image, and an optical system (lenses 71-75, dichroic mirrors 64 and 65, filters 76 and 77);
an image processing apparatus 57 for processing a video signal for autofluorescence image; a CCU 84 for generating a video signal for reflected-light image;
a superimpose circuit 85 for superimposing the aforesaid two video signals; and
a monitor 30 for displaying an autofluorescence image 86 and a reflected light image 87 in parallel on the screen of the display based on the video signals via the superimpose circuit 85.

[0059]
Operation of this embodiment will be explained next. First, excitation light from the light source apparatus 82 irradiate [a tissue] through the light guide 25 of the endoscope 27 and autofluorescence or reflected light from the tissue is detected by the camera 83 via the image guide 26. At this time, the reflected light of the excitation light is projected on the CCD 66 and specific wavelengths of green and red in autofluorescence are projected on the image intensifiers 67and 69 and CCDs 68 and 70, and after the reflected image and the fluorescence image are respectively converted into video signals, they are synthesized in the superimpose circuit 85 and displayed on the monitor 30 in parallel.

[0060]
According to this embodiment, the following effect can be obtained. Since a diseased area and a bleeding area and a shadow were detected as dark images in a fluorescence image, it was difficult to distinguish these areas. However, a diseased area is a bright reflected image in a reflected-light image like a normal area and a bleeding area and a shadow are comparatively dark. Therefore, by displaying a fluorescence image and a reflected image simultaneously on a monitor, they can be distinguished easily. Moreover, it is easy to watch a biopsy forceps under reflected-light imaging so that it is conceivable that an accurate biopsy can be performed.

[0061]
In addition, the endoscope 27 of Fig. 2 is formed by the image guide 26 which consists of a bundle of fibers. However, it is applicable for a case of using an endoscope which consists of an image guide or an optical image transmission means with a relay optical system. Different embodiments may be structured such by combining some parts of each embodiment described above and such embodiments will belong to this invention.

[0062]
[Additional Remarks]
2. With a fluorescence diagnosing apparatus which comprises:
a light source for generating excitation light to emit fluorescence from a tissue;
an endoscope containing an image guide for detecting fluorescence from a tissue as a two-dimensional image; and a camera which has an imaging means for capturing at least one fluorescence image in specific wavelengths from two-dimensional fluorescence images and is connected to the aforesaid endoscope,
A fluorescence diagnosing apparatus which is provided with:
a light source having a low intensity of illumination, which generates illumination light having a wavelength of a part of at least one specific wavelength provided in the aforesaid light source;
a combining means to combine the aforesaid excitation light and illumination light;
a control unit by which the aforesaid illumination light and excitation light can be turned on and off independently.

[0063]
3. The fluorescence diagnosing apparatus mentioned in Additional Remark 2 in which the aforesaid light source having a low intensity of illumination has a wavelength in a region including green and red wavelengths, and the aforesaid excitation light has a wavelength in the blue region and the aforesaid image detecting means detects an image corresponding to each wavelength of blue, green and red.

[0064]
4. The fluorescence diagnosing apparatus mentioned in Additional Remark 2 in which the aforesaid light source having a low intensity of illumination is a LED or LD.
5. The fluorescence diagnosing apparatus mentioned in Additional Remark 2 in which the aforesaid combining means is a dichroic mirror which reflects/transmits light depending on a wavelength.

[0065]
6. The fluorescence diagnosing apparatus mentioned in Additional Remark 2 in which the aforesaid excitation light is a 442 nm light by a He-Cd laser.

[0066]
7. A fluorescence diagnosing apparatus which comprises:
a light source for generating excitation light to emit fluorescence from a tissue;
an endoscope containing an image guide for detecting fluorescence from a tissue as a two-dimensional image and which irradiates the aforesaid excitation light in a body cavity; and a camera which has an imaging means for capturing at least one fluorescence image in specific wavelengths from two-dimensional fluorescence images and is connected to the aforesaid endoscope,
which further comprises:
a second imaging means in the aforesaid camera for detecting reflected light from the tissue irradiated by the aforesaid excitation light as a two-dimensional image; a superimpose means for synthesizing both the aforesaid fluorescence image and reflected image on the same screen; and
a display means for displaying it.

[0067]
[Effect of the Invention]
According to this invention described above,
a fluorescence diagnosing apparatus which comprises:
a biopsy forceps having:

> an elongated insertion part which can be inserted in the channel of an endoscope for observing organs in a body cavity,
> cups for collecting tissue provided at the distal end of the aforesaid insertion part which can be opened and closed, an operating part for controlling the opening/closing of the aforesaid cups which is provided on the handle side of the insertion part,
> optical fibers which are installed inside the aforesaid insertion part and its emission end is placed near the base of the aforesaid cups to irradiate the transmitted excitation light to a target tissue and pick up fluorescence from the tissue when the aforesaid cups are in the open state;

a light source apparatus by which the excitation light is incident to the aforesaid optical fibers;
a spectrometer for detecting the aforesaid fluorescence via the aforesaid optical fibers and disintegrating it into a spectrum;

an analyzer for analyzing the aforesaid spectrum and diagnosing the characteristics of the target tissue; and a display device for displaying the analysis information from the aforesaid analyzer.

Thus, before performing the biopsy, an area to be examined is irradiated by excitation light from the distal end of optical fibers and fluorescence from the tissue can be picked up. Thus, a fluorescence diagnosis of whether it is a diseased area or a normal area can be performed. Since the actual biopsy is performed when the area has a high possibility of a disease based on that result, the biopsy on a diseased tissue can be performed more reliably.

[Brief Explanation of Drawings]

[Fig. 1]

a schematic diagram of a fluorescence diagnosing apparatus of a first embodiment of this invention.

[Fig. 2]

a schematic diagram of a fluorescence diagnosing apparatus of a second embodiment of this invention.

[Fig. 3]

a schematic diagram of a light source of a modification of the second embodiment.

[Fig. 4]

a schematic diagram of a camera of a modification of the second embodiment.

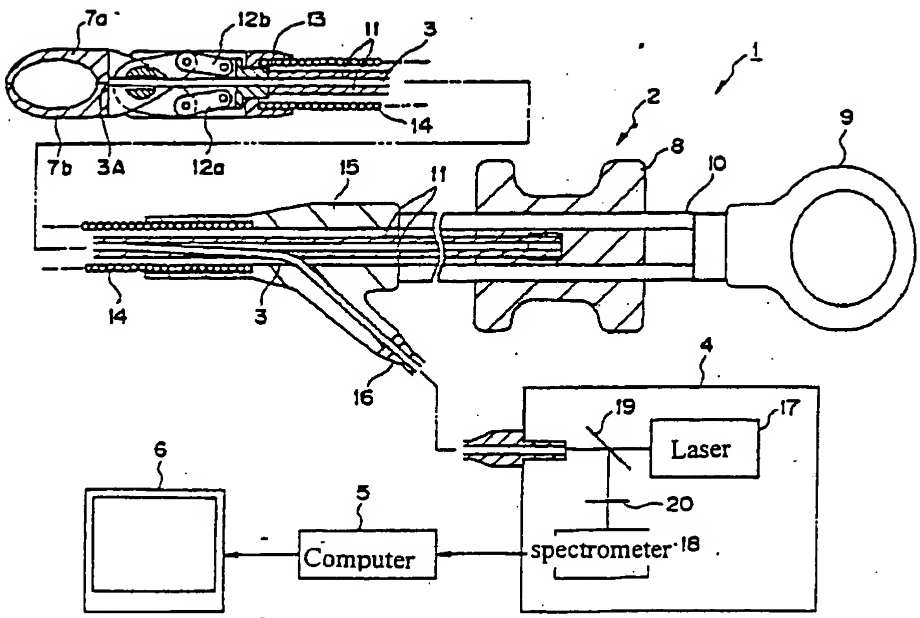
[Fig. 5]

a schematic diagram of a fluorescence diagnosing apparatus of a third embodiment of this invention.

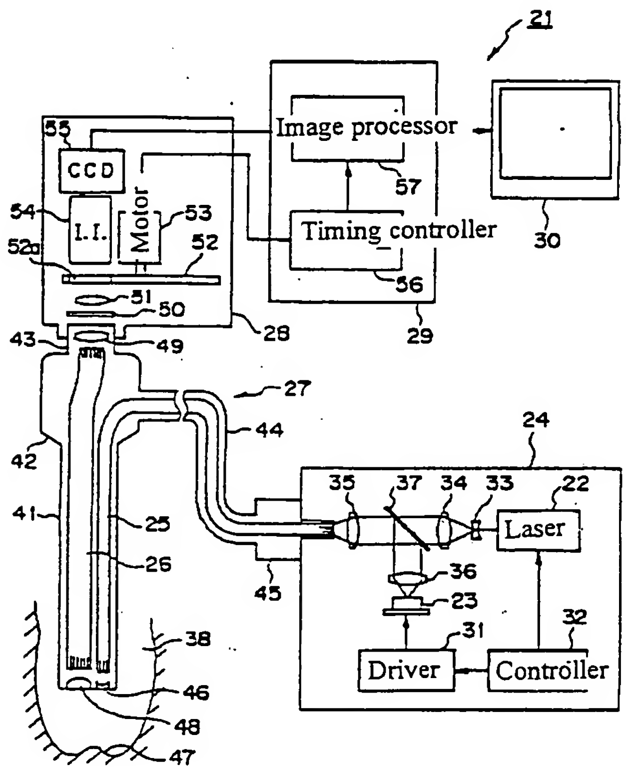
[Explanation of Symbols]

1...fluorescence diagnosing apparatus
2...a biopsy forceps with a optical diagnostic function
3...optical fiber
3A...distal surface
4...analyzer
5...computer
6...color monitor
7a, 7b...cups
8...slider for operation
9...finger hook
10...operating member
11...operating wire
12a, 12b...link
13...connecting part
14...coil sheath
15...sheath fixing member
16...connecting cable
17...laser
18...spectrometer
19...dichroic mirror
20...filter
21...fluorescence diagnosing apparatus
23...LD
25...light guide
26...image guide
27...endoscope
28...camera
29...processing apparatus
30...color monitor
57...image processor

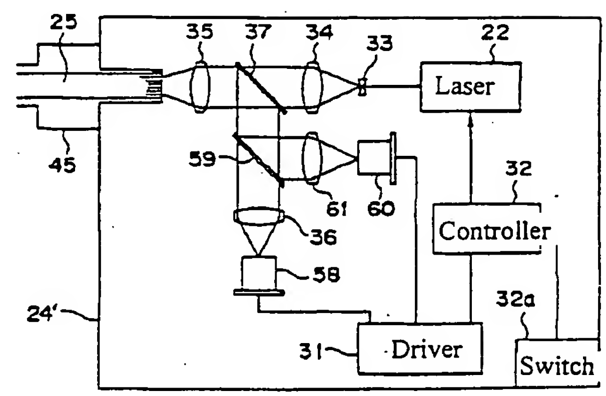
[Fig. 1]



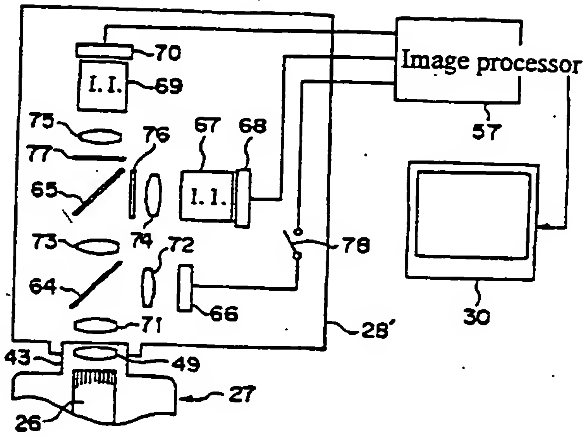
[Fig. 2]



[Fig. 3]



[Fig. 4]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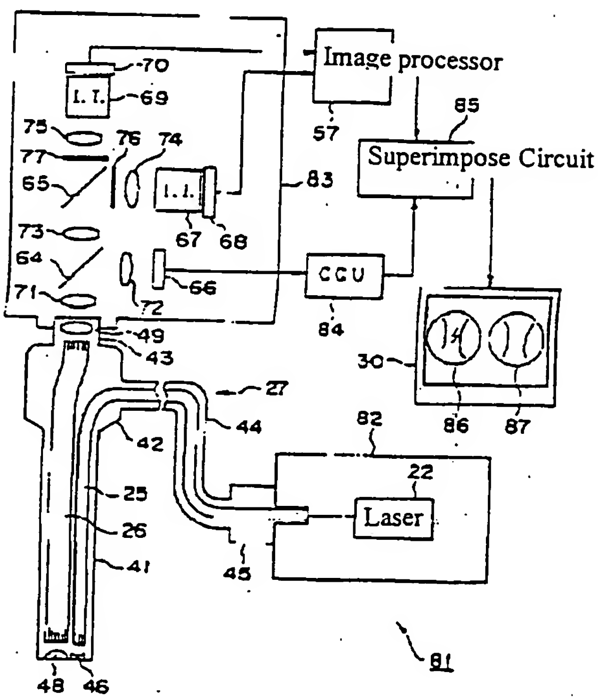
[Fig. 5]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MACHINE-ASSISTED TRANSLATION (MAT):

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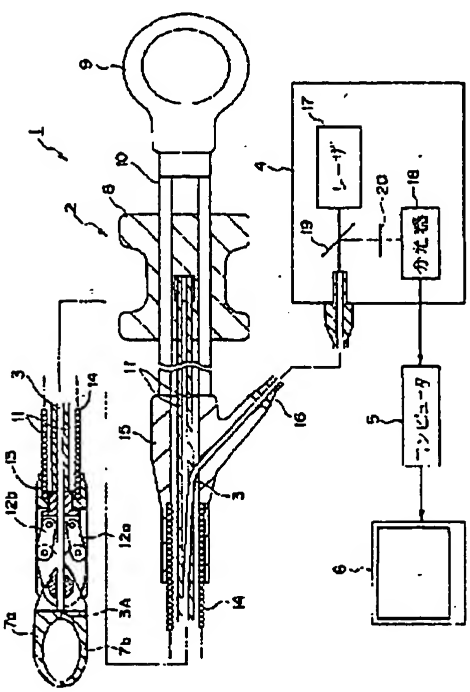
(57)【要約】	(57)[SUMMARY]
【目的】 経内視鏡的に、出血することなく病変部の蛍光スペクトルを測定でき、病変組織をより確実に生検できる蛍光診断装置を提供すること。	[OBJECT] Perendoscopically, the fluorescence spectrum of a disease part can be measured, without causing bleeding. Offer the fluorescent-diagnosis apparatus to which the biopsy of the lesioned tissue can be done more reliably.
【構成】 内視鏡のチャンネルに挿通可能な細長のコイルシース１４の先端に生検用のカップ７ａ，７ｂを設け、操作ワイヤ１１を介して手元側操作部での操作により開閉できる。コイルシース１４内には先端面３Ａがカップ７	[SUMMARY OF THE INVENTION] The cups 7a and 7b for biopsies are provided at the end of the long and slender coil sheath 14 which can be passed through to the channel of an endoscope. It can open and close by the operation by the hand side operating part via the operation wire 11.

a，７ｂの根本に取り付けられた光ファイバ３が挿通され、後端は分析装置４に接続され、レーザ１７からの励起光を伝送し、カップ７a，７ｂを開くとその先端面３Ａから対象組織に励起光を照射し、かつ対象組織からの蛍光を取り込み、スペクトルに分ける分光器１８に入力し、コンピュータ５でスペクトル波形の解析から正常な部位か病変部かの判断を行い、結果をカラーモニタ６に結果を表示する。

The optical fibre 3 by which end surface 3A was attached in the coil sheath 14 at the origin of cups 7a and 7b is passed through.
A rear end is connected to an analyser 4.
The excitation light from a laser 17 are transmitted.
If cups 7a and 7b are opened, excitation light will be irradiated from that end surface 3A to an object tissue. And the fluorescence from an object tissue is received. It inputs into the spectrometer 18 divided into a spectrum. A computer 5 performs judgement of a normal part or a disease part from the analysis of a spectrum waveform.

A result is displayed a result to the colour monitor 6.

5 Computer	18 Spectrometer	17 Laser



【特許請求の範囲】

【請求項１】

体腔内臓器を観察する内視鏡のチャンネル内に挿通可能な細長の挿入部と、前記挿入部の先端に設けられた組織を採取するための開閉可能なカップと、挿入部の手元側に設けられた前記カップを開閉操作する操作部と、前記挿入部内に組み込まれ、前記カップの根本付近に光の出射端を配置され前記カップを開いた状態では、伝送した励起光を照射し、かつ対象組織側からの蛍光を取り込み可能とする光ファイバとを有する生検鉗子と；前記光ファイバへ励起光を入射する光源装置と；前記蛍光を前記光ファイバを通じ検出し、スペクトルに分解する分光器と；前記スペクトルを解析し、対象組織の性状を診断するための解析装置と；前記解析装置による解析情報を表示する表示装置と；から構成される蛍光診断装置。

[CLAIMS]

[CLAIM 1]

It is included in the operating part which performs the opening-closing operation of the long and slender insertion part which can be passed through in the channel of the endoscope which observes an intra-corporeal organ, the openable cup for extracting the tissue provided at the end of an above-mentioned insertion part, and the above-mentioned cup provided in the hand side of an insertion part, and an above-mentioned insertion part.

Where it arranges the radiation end of a light near the origin of an above-mentioned cup and an above-mentioned cup is opened, the transmitted excitation light are irradiated.

And biopsy forceps which has the optical fibre which makes it possible receiving of the fluorescence from an object tissue side; Light source device which performs incidence of the excitation light to an above-mentioned optical fibre; Spectrometer which an above-mentioned fluorescence is detected through an above-mentioned optical fibre, and is dissolved into a spectrum;

Analysis apparatus for analysing an above-mentioned spectrum and diagnosing the characteristic of an object tissue;

Display device which displays analysis information by above-mentioned analysis apparatus; The fluorescent-diagnosis apparatus which consists of the above-mentioned.

【発明の詳細な説明】

[DETAILED DESCRIPTION OF INVENTION]

【０００１】

[0001]

【産業上の利用分野】
本発明は経内視鏡的に光を照射し、対象組織からの自家蛍光から癌等の病変部を観察及び生検する蛍光診断装置に関連する。

[INDUSTRIAL APPLICATION]
This invention irradiates a light perendoscopically. Disease parts, such as cancer, are related to an observation and the fluorescent-diagnosis apparatus which performs a biopsy, from the home fluorescence from an object tissue.

【０００２】

[0002]

【従来の技術】
近年、生体からの自家蛍光や生体へ注入した薬物の蛍光を２次元画像として検出し、その蛍光像から生体組織の変性や癌等の疾患状態（例えば、疾患の種類や浸潤範囲）を診断する技術が米国特許４５５６０５７号や５０４２４９４号に示されている。

[PRIOR ART]
In recent years, it is detected, doing the fluorescence of the medicine injected from the organism to a home fluorescence and the organism as a two-dimensional image.

The technology that illness condition (for example, the variety and permeation range of the illness), such as the denaturation of an organism tissue and cancer, is diagnosed from that fluorescent image is shown in the U.S. patent number of No. 4556057, and No. 5042494.

【０００３】
生体組織に光を照射するとその励起光より長い波長の蛍光が発生する。生体内の蛍光物質としては、例えばＮＡＤＨ（ニコチンアミドアデニンヌクレオチド）やＦＭＮ（フラビンモノヌクレオチド），ピリジンヌクレ

[0003]
If a light is irradiated to an organism tissue, the fluorescence of a wavelength longer than those excitation light will occur.

It does as a fluorescent material in the living body, for example, there are NADH (nicotinamide adenine nucleotide), FMN (flavin mononucleotide), pyridine nucleotide, etc.

オチド等があり、最近では、これらの生体内因物質と疾患との相互関係が明確になりつつある。

Recently, the interactive relationship of these causative substances in the living body and illness is becoming clear.

【０００４】

この様な蛍光から経内視鏡的に、病変部を診断する技術として、本出願人より出願された特願平５－３０４４２７がある。これは組織に４４２ nm の青色の励起光を照射した時、発生する自家蛍光が正常と異常でそのスペクトルに差があることを利用し画像化するものである。この従来例では自家蛍光の緑と赤の領域の画像を比較演算し、癌部を擬似カラー表示したものである。

[0004]

It considers as the technology that a disease part is diagnosed, and Japanese Patent Application No. 5-304427 for which it applied from this applicant is in such a fluorescent from warp endoscope manner.

This becomes as follows when irradiating 442 nm blue excitation light to a tissue. It is abnormal in the home fluorescence to generate being normal, and it utilises and images that a difference is in that spectrum.

In this prior art example, the comparison calculation of the green of a home fluorescence and the image of a red area is performed.

The imitation colour display of the cancerous part is performed.

【０００５】

また、特開平６－３８９６７号公報には癌等の病変部の自家蛍光及びＨｐＤの蛍光から判別し、その組織を取り除く方法が示されている。この先行例は、メスや生検針に光ファイバが組み込まれ、手術中、癌の転移を診断し、切除するものである。

[0005]

Moreover, in the unexamined-Japanese-patent-No. 6-38967 gazette, it distinguishes from the home fluorescence of disease parts, such as cancer, and the fluorescence of HpD.

The method of removing that tissue is shown.

As for this example of preceding, an optical fibre is included in a scalpel or the biopsy needle. A cancer metastasis is diagnosed during surgery and is excised.

【０００６】

[0006]

【発明が解決しようとする問題

[PROBLEM ADDRESSED]

点】
開腹手術時、組織を蛍光スペクトルから切除する方法が示されている。しかしながら、本先行例においては、経内視鏡的に組織のスペクトルを測定し、組織を生検するものではなかった。
また、本先行例においては、メスや生検針の先端に光プローブが付属されたものである。開腹手術においては前記メス、生検を軽く押し当てスペクトルを測定した後切除可能であるが経内視鏡的にメスや生検針を挿入した場合、メスや針により出血を伴なう可能性がある。

The method of excising a tissue from a fluorescence spectrum is shown at the time of a laparotomy.

However, in this example of preceding, the spectrum of a tissue is measured perendoscopically.

It was not that which performs the biopsy of the tissue.

Moreover, in this example of preceding, an optical probe is attached at the end of a scalpel or the biopsy needle.

In a laparotomy, it is an above-mentioned scalpel and a biopsy a pushing lightly. After measuring a spectrum, although it was excisable, when a scalpel and the biopsy needle are inserted perendoscopically, it may be accompanied by haemorrhage by a scalpel or a needle.

【０００７】
蛍光測定においては出血は特にノイズとなり、血中ヘモグロビンの強い光の吸収により、蛍光が検出できないことが考えられる。

[0007]
In a fluorescent measurement, especially the haemorrhage is a noise.

By the strong absorption of the light of the haemoglobin in blood, it can consider that a fluorescence is undetectable.

【０００８】
本発明は上述した点に鑑みてなされたもので、経内視鏡的に、出血することなく病変部の蛍光スペクトルを測定でき、病変組織をより確実に生検できる蛍光診断装置を提供することを目的とする。

[0008]
This invention was formed in consideration of the above-mentioned point. Therefore, the fluorescence spectrum of a disease part can be measured perendoscopically, without causing bleeding.

It aims at offering the fluorescent-diagnosis apparatus to which the biopsy of the lesioned tissue can be done more reliably.

【0009】

[0009]

【問題点を解決する手段及び作用】
体腔内臓器を観察する内視鏡のチャンネル内に挿通可能な細長の挿入部と、前記挿入部の先端に設けられた組織を採取するための開閉可能なカップと、挿入部の手元側に設けられた前記カップを開閉操作する操作部と、前記挿入部内に組み込まれ、前記カップの根本付近に光の出射端を配置され前記カップを開いた状態では、伝送した励起光を照射し、かつ対象組織側からの蛍光を取り込み可能とする光ファイバとを有する生検鉗子と；前記光ファイバへ励起光を入射する光源装置と；前記蛍光を前記光ファイバを通じ検出し、スペクトルに分解する分光器と；前記スペクトルを解析し、対象組織の性状を診断するための解析装置と；前記解析装置による解析情報を表示する表示装置と；から構成され、カップを開くことにより出血させる前に光ファイバの先端面から生検しようとする対象組織側に励起光を照射し、かつ対象組織からの蛍光を取り込むことができるので、取り込んだ蛍光のスペクトル波形の解析により対象組織が正常部位か病変部位であるかを判断できるので、この判断結果

[Means to solve the problem, and an effect]
It is included in the operating part which performs the opening-closing operation of the long and slender insertion part which can be passed through in the channel of the endoscope which observes an intra-corporeal organ, the openable cup for extracting the tissue provided at the end of an above-mentioned insertion part, and the above-mentioned cup provided in the hand side of an insertion part, and an above-mentioned insertion part.
Where it arranges the radiation end of a light near the origin of an above-mentioned cup and an above-mentioned cup is opened, the transmitted excitation light are irradiated.
And biopsy forceps which has the optical fibre which makes it possible receiving of the fluorescence from an object tissue side; Light source device which performs incidence of the excitation light to an above-mentioned optical fibre; Spectrometer which an above-mentioned fluorescence is detected through an above-mentioned optical fibre, and is dissolved into a spectrum;
Analysis apparatus for analysing an above-mentioned spectrum and diagnosing the characteristic of an object tissue;
Display device which displays analysis information by above-mentioned analysis apparatus; It consists of the above-mentioned.
Before making a cup bleed by the opening, excitation light are irradiated from the end surface of an optical fibre to the object tissue

により病変部位である可能性が高い部位のみを生検を行うようにすることにより病変組織をより確実に生検できる。

side which is going to perform a biopsy.

And because the fluorescence from an object tissue can be received, it can judge whether an object tissue is a normal part or a disease part in the analysis of the received fluorescent spectrum waveform. Therefore, only the part with high possibility that it is a disease part becomes as follows by performing a biopsy by this judgement result. The biopsy of the lesioned tissue can be done more reliably.

【００１０】

[0010]

【実施例】

以下、図面を参照して本発明の実施例を具体的に説明する。図１は本発明の第１実施例の蛍光診断装置１を示す。この第１実施例の蛍光診断装置１は生検機能と光診断機能とを備えた鉗子を利用したものであり、より具体的には光プローブを内蔵した生検鉗子を利用したものである。

[Example]

Hereafter, with reference to a drawing, the example of this invention is explained concretely.

Fig. 1 shows the fluorescent-diagnosis apparatus 1 of the 1st example of this invention.

The fluorescent-diagnosis apparatus 1 of this 1st example utilises the forceps provided with biopsy function and the optical diagnostic function.

The biopsy forceps which more specifically built in the optical probe is utilised.

【００１１】

図１に示す第１実施例の蛍光診断装置１は、蛍光により対象組織の性状を判断しつつ、その部位を生検する機能を備えた生検鉗子としての光診断機能付生検鉗子２と、この光診断機能付生検鉗子２に内蔵された光ファイバ３に励起光を供給すると共に、対象組織からの蛍光を検出

[0011]

The fluorescent-diagnosis apparatus 1 of the 1st example shown in Fig. 1 becomes as follows. While supplying excitation light to the optical fibre 3 built in the biopsy forceps with an optical diagnostic function 2 as a biopsy forceps provided with function which performs the biopsy of that part, and this biopsy forceps with an optical diagnostic function 2, judging the characteristic of an object tissue according to a

する分析装置４と、この分析装置４からのデータを解析し、組織の性状（癌か、ポリープか、正常か等）を判別するコンピュータ５と、その結果を表示する表示手段としてのカラーモニタ６と、前記光診断機能付生検鉗子２が挿通されるチャンネルを有する図示しない内視鏡及びその周辺機器（内視鏡に照明光を供給する光源装置等）とから構成される。

fluorescence, the data from the analyser 4 which detects the fluorescence from an object tissue, and this analyser 4 are analysed.

It consists of the computer 5 which distinguishes cancer, a polyp, and the characteristics of a tissue, such as whether to be normal, the colour monitor 6 as display means to display result, and the endoscope which has the channel by which the above-mentioned biopsy forceps with an optical diagnostic function 2 is passed through (not illustrated) and its peripheral device (light source device which supplies an illumination light to an endoscope).

【００１２】

前記光診断機能付生検鉗子２は、内視鏡のチャンネル内に挿通される細長の鉗子挿入部の先端部に対象となる組織をつまみ取るための１対のカップ７ａ，７ｂを設けて生検部が形成され、この鉗子挿入部の後端側の操作部には前記カップ７ａ，７ｂを開閉するために指掛９を設けた操作部材１０とこの操作部材１０に対して摺動自在の操作用スライダ８とが形成されている。

[0012]

The above-mentioned biopsy forceps with an optical diagnostic function 2 provides 1 pair of cups 7a and 7b for pinching the tissue functioning as an object to the point of the long and slender forceps insertion part passed through in the channel of an endoscope, and a biopsy part is formed.

In order to open and close the above-mentioned cups 7a and 7b to the operating part at the side of the rear end of this forceps insertion part, the slidable slider for operation 8 is formed to the operational member 10 which provided the finger hook 9, and this operational member 10.

【００１３】

そして、前記操作用スライダ８の動きと連動して前記カップ７ａ，７ｂを開閉させるため、力を伝達するワイヤ１１が鉗子挿

[0013]

And, in order for movement of the above-mentioned slider for operation 8 to be interlocked with and to make the above-mentioned cups 7a and 7b open and close, the

入部内に挿通され、このワイヤ１１の後端は操作用スライダ８に固定され、このワイヤ１１の先端はカップ７ａ，７ｂを開閉させるために、該カップ７ａ，７ｂと連結され、リンク機構を形成するリンク１２ａ，１２ｂと継ぎ部１３を介して連結されている。

wire 11 which transmits power is passed through in a forceps insertion part.
The rear end of this wire 11 is fixed by the slider for operation 8.
The end of this wire 11 is coupled with the cups 7a and 7b, in order to make cups 7a and 7b open and close.
It couples via the links 12a and 12b, and a splice part 13 which forms a link mechanism.

【００１４】
前記鉗子挿入部は例えば密巻きコイルによるコイルシース１４で形成され、このコイルシース１４内にワイヤ１１及び光ファイバ３が挿通され、このコイルシース１４により屈曲自在の状態で保護している。このコイルシース１３の後端側は斜め後方に分岐する分岐部を設けたシース固定部材１５の先端側に固定され、このシース固定部材１５の後方側に指掛９を設けた操作部材１０と、この操作部材１０に対して摺動可能で、かつワイヤ１１の後端が固定された操作用スライダ８とが設けてある。

[0014]
An above-mentioned forceps insertion part is formed, for example, with the coil sheath 14 by the close-coiling coil.
The wire 11 and the optical fibre 3 are passed through in this coil sheath 14.
It has protected in the bending-free condition with this coil sheath 14.
The rear-end side of this coil sheath 13 is fixed at the end side of the sheath fixing member 15 which provided the takeoff connection branched to diagonal rear.
To the operational member 10 which provided the finger hook 9 in the rear side of this sheath fixing member 15, and this operational member 10, it is slidable and the slider for operation 8 with which the rear end of a wire 11 was fixed is provided.

【００１５】
また、シース固定部材１５の斜め後方に分岐する分岐部に設けた中空孔には光ファイバ３が挿通され、分岐部から後端側に延出され、コネクタケーブル１６を介して分析装置４と接続され

[0015]
Moreover, an optical fibre 3 is passed through by the hollow hole provided in the takeoff connection branched to the rear diagonal to the sheath fixing member 15.
It extends from a branch connection at a rear-end side.

る。

It connects with an analyser 4 via the connector cable 16.

【００１６】
また、前記分析装置４は組織の蛍光を励起するための光源としてのレーザ（装置）１７と、組織からの蛍光をスペクトルに分離する分光器１８とを有し、コネクタケーブル１６が接続された状態では光ファイバ３の端面とレーザ１７とが対向し、この間の光路中にレーザ光と蛍光を分離するダイクロイックミラー１９が配置され、レーザ１７から出射されたレーザ光を透過する。また、光ファイバ３で伝送された蛍光はダイクロイックミラー１９で反射され、対向する分光器１８に励起光をカットするフィルタ２０を介して入射される。前記レーザ１７は例えばＨｅ－Ｃｄレーザで形成され、このＨｅ－Ｃｄレーザは４４２ nm の波長のレーザ光を励起光として発生する。

[0016]
Moreover, the above-mentioned analyser 4 has the laser (apparatus) 17 as a light source for exciting the fluorescence of a tissue, and the spectrometer 18 which separates the fluorescence from a tissue with a spectrum.
Where the connector cable 16 is connected, the end face and the laser 17 of an optical fibre 3 oppose.
The dichroic mirror 19 which separates a laser light and a fluorescence is arranged in an optical path in the meantime.

The transmission of the laser light which it radiated from the laser 17 is performed.
Moreover, the fluorescence transmitted by the optical fibre 3 is reflected by the dichroic mirror 19.

Incidence is performed to the opposing spectrometer 18 via the filter 20 which cuts excitation light.
The above-mentioned laser 17 is formed, for example, by the He-Cd laser.

This He-Cd laser generates a laser light with a wavelength of 442 nm as excitation light.

【００１７】
この実施例では光診断機能付生検鉗子２に内蔵された光ファイバ３の先端側はカップ７ａ，７ｂの根本部にその光ファイバ３の先端面３Ａが位置するように取り付けられ、この状態ではカップ７ａ，７ｂが開いた場合に

[0017]
In this example, install the end side of the optical fibre 3 built in the biopsy forceps with an optical diagnostic function 2 so that end surface 3A of that optical fibre 3 situates among the fundamental part of cups 7a and 7b.

In this condition, when cups 7a and 7b open, end surface 3A of an optical fibre 3 is exposed.

は光ファイバ３の先端面３Ａが露出する。そして、生検しようとする組織側に先端面３Ａから励起光を照射できると共に、組織側からの蛍光を取り込むことができる構造にしていることが特徴となっている(換言すると、生検処置により出血が伴う前に、蛍光観察を行うことができるようにしている）。

And, while excitation light can be irradiated from end surface 3A to the tissue side which is going to perform a biopsy, it has been the characteristic to make the structure where the fluorescence from a tissue side can be received. (In other words, by the biopsy treatment, before there is haemorrhage, it enables it to perform a fluorescent observation.)

【００１８】
次に作用を説明する。まず、光診断機能付生検鉗子２を図示しない、予め生体体腔内に挿入された内視鏡チャンネルを通し、体腔内まで導入させる。そして、病変と思われる組織に光診断機能付生検鉗子２の先端部のカップ７ａ，７ｂを近か付け、操作用スライダ８を指掛９と反対方向にスライドさせ、前記カップ７ａ，７ｂを開く。さらに開いたまま、そのカップ７ａ，７ｂの根本にある光ファイバ３の先端面３Ａを組織と接触させる。

[0018]
Next an effect is explained.
First, the endoscope channel in which the biopsy forceps with an optical diagnostic function 2 was beforehand inserted by the organism intra-corporeal is passed through (not illustrated).
It is made to guide to an intra-corporeal.
And, the cups 7a and 7b of the point of the biopsy forceps with an optical diagnostic function 2 are brought close to the tissue considered to be a disease.
The slider for operation 8 is made to slide in a finger hook 9 and the opposite direction.
The above-mentioned cups 7a and 7b are opened.
Furthermore end surface 3A of the optical fibre 3 in the origin of those cups 7a and 7b is made to contact with a tissue, as is in an opening condition.

【００１９】
この時、レーザ１７より励起光を光ファイバ３に入射し、組織に照射する。組織からの自家蛍

[0019]
At this time, incidence of the excitation light is performed to an optical fibre 3 from a laser 17.
It irradiates to a tissue.

光を、前記光ファイバ３で受け、ダイクロイックミラー１９で蛍光を反射し、励起光をフィルタ２０によりカットした後、分光器１８に入射する。つまり、前記ダイクロイックミラー１９は励起光を透過し、それより長い波長の蛍光を反射する。

The home fluorescence from a tissue is received by the above-mentioned optical fibre 3.

A fluorescence is reflected by the dichroic mirror 19.

After cutting excitation light with a filter 20, incidence is performed to a spectrometer 18.

In other words, the above-mentioned dichroic mirror 19 performs the transmission of the excitation light.

The fluorescence of a wavelength longer than that is reflected.

【００２０】

分光器１８によりスペクトルに分離し、かつそのスペクトル強度をコンピュータ５側に送り、コンピュータ５で蛍光の波長域全体におけるスペクトル波形強度を算出すると共に、正常部位と、病変部等の異常部位とで顕著な差異を示す２つの波長でのスペクトル波長強度の解析を行い、対象組織が正常部位であるか病変部等の異常部位であるかの解析結果をカラーモニタ６に表示する。術者はその解析結果により異常部位である可能性が高い場合に（出血を伴う）生検処置を行うようにすることにより病変組織をより確実に生検できるし、むやみに多くの部位から生検を行う必要が無くなるので、患者に対する苦痛を軽減することもできる。

[0020]

It separates with a spectrum with a spectrometer 18.

And that spectral intensity is sent to a computer 5 side.

While computing spectrum waveform strength in the fluorescent entire wavelength range by computer 5, spectrum wavelength strength in 2 wavelengths which show a remarkable variant by the normal part and abnormal parts, such as a disease part, is analysed.

The analysis result of whether an object tissue is a normal part or they are abnormal parts, such as a disease part, is displayed to the colour monitor 6.

An operator can do the biopsy of the lesioned tissue more reliably by being made to perform a biopsy (accompanied by haemorrhage) treatment by that analysis result, when possibility that it is an abnormal part is high.

And, because the necessity of performing a biopsy eliminates from many part excessively, the suffering to a patient is also reducible.

【0021】
この実施例によれば以下の効果がある。実際の生検処置により出血させる前に対象組織が正常であるかと異常であるかが判断できるので、病変組織をより確実に生検することができる環境を実現できる。

[0021]
According to this example, there are the following effects.

Before making it bleed by the actual biopsy treatment, an object tissue can judge whether normal or it is abnormal. Therefore, the environment which can perform the biopsy of the lesioned tissue more reliably is realisable.

【0022】
次に生検鉗子を用いないで、内視鏡を用いて蛍光診断を行う第２実施例の蛍光診断装置を図２を参照して説明する。図２ないし図４の装置では補助光源手段或いは補助光源の機能を備えたものである。まず、その背景を説明する。

[0022]
Next the fluorescent-diagnosis apparatus of the 2nd example which performs fluorescent diagnosis using an endoscope is explained with reference to Fig. 2 without using a biopsy forceps.

In the apparatus of Fig. 2 or 4, function of auxiliary light-source means or an auxiliary light source is provided.

First, that background is explained.

【0023】
従来例では蛍光観察時は励起用光源とそのための高感度カメラを接続し、通常観察時は白色光源とそのためのカメラに接続後切り換え観察していた。蛍光観察では微弱な蛍光を検出しているため、近接させて観察していた。しかしながら胃等の広い空間内に挿入した際、接眼と組織までの距離が遠くなり、暗い画像となり、オリエンテーションがつけづらい。または出血時は光の吸収のため暗くなる等の問題があった。

[0023]
In a prior art example, the high sensitive camera for it is connected with the light source for excitation at the time of a fluorescent observation.

It switched after connecting with a white light source and the camera for it at the time of a usual observation, and it was observed.

In the fluorescent observation, since the weak fluorescence was detected, it was observing by making it neighbouring.

However when inserting within the space where the stomach etc. is large, the distance to an eye-piece and a tissue becomes far.

It becomes a dark image.

It is hard to do an orientation.

Or there were problems, such as becoming dark, because of the absorption of a light at the time of bleeding.

【００２４】
そこで本実施例は、その様な時でも蛍光観察の条件（例えばカメラの感度、レーザ強度）を変えることなく、反射光での撮像を可能とするような良好なオリエンテーションを実現することを目的とし、この目的を達成する補助光源手段を備えた蛍光診断装置を以下のような構成にしている。

[0024]
Consequently this example aims at materialising the favourable orientation which enables the image pick-up by reflected light, without changing the conditions (for example, the sensitivity of a camera, laser strength) of a fluorescent observation also in that time.

The fluorescent-diagnosis apparatus provided with auxiliary light-source means to attain this objective is made to the following components.

【００２５】
図２に示す第２実施例の蛍光診断装置２１は、蛍光を励起するためのレーザ２２と、蛍光観察時の補助光源であるレーザダイオード（以下、ＬＤと略記）２３とが内蔵された光源装置２４と、前記光源装置２４からの光を体腔内に照射するためのライトガイド２５と、その蛍光及び反射光を２次元のイメージ像として伝送するイメージガイド２６とが内蔵された内視鏡２７と、前記内視鏡２７から得られた蛍光像、反射光像をビデオ信号に変換するカメラ２８と、前記ビデオ信号を処理する処理装置２９と、表示装置としてのカラーモニタ３０より構成され

[0025]
The fluorescent-diagnosis apparatus 21 of the 2nd example shown in Fig. 2 is with the laser 22 for exciting a fluorescence. The light source device 24 in which the laser diode (below, LD abbreviation) 23 which is an auxiliary light source at the time of a fluorescent observation was built, the light guide 25 for irradiating the light from the above-mentioned light source device 24 to an intra-corporeal, the endoscope 27 in which the image guide 26 which transmits that fluorescence and reflected light as a two-dimensional image was built, the camera 28 which converts the fluorescent image obtained from the above-mentioned endoscope 27, and a reflected-light image into a video signal, the processing apparatus 29 which processes an above-mentioned video signal, It consists of the above-mentioned and the colour monitor 30 as

る。

a display device.

【００２６】
光源装置２４は、励起光を発生するレーザ２２と、反射光による撮像のための照明光を発生するＬＤ２３と、ＬＤ２３を駆動するドライバ３１と、前記ドライバ３１とレーザ２２をコントロールするコントローラ３２と、これら光をライトガイド２５に導光するレンズ３３，３４，３５，３６と、レーザ２２の光とＬＤ２３の光を透過及び反射により合成する合成手段を形成するダイクロイックミラー３７とから構成される。前記レーザ２２は例えばＨｅ－Ｃｄレーザで形成され、このＨｅ－Ｃｄレーザは４４２ nm の波長のレーザ光を励起光として発生する。

[0026]
A light source device 24 is with the laser 22 which generates excitation light. LD 23 which generates the illumination light for the image pick-up by reflected light, the driver 31 which drives LD 23, the above-mentioned driver 31 and the controller 32 which performs the control of the laser 22, the lenses 33, 34, 35, and 36 which perform the light-guide of these light to a light guide 25, It consists of the dichroic mirror 37 which forms synthetic means to synthesise the light of a laser 22, and the light of LD 23 by the transmission and the reflection.
The above-mentioned laser 22 is formed, for example, by the He-Cd laser.
This He-Cd laser generates a laser light with a wavelength of 442 nm as excitation light.

【００２７】
前記内視鏡２７は、体腔３８内に挿入可能な細長の挿入部４１と、この挿入部４１の後端に形成された操作部４２と、この操作部４２の後端に形成された接眼部４３と、操作部４２の側部から延出されたライドガイドケーブル４４とを有し、このライトガイドケーブル４４の端部のコネクタ４５を光源装置２４に着脱自在で接続することができる。

[0027]
The above-mentioned endoscope 27 has the light-guide cable 44 extended from the long and slender insertion part 41 which can be inserted within a body cavity 38, the operating part 42 formed on the rear end of this insertion part 41, the eye-piece part 43 formed on the rear end of this operating part 42, and the side part of an operating part 42.
It is detachable to a light source device 24, and the connector 45 of the edge part of this light-guide cable 44 can be connected to it.

【００２８】
挿入部４１内にはライトガイド２５が挿通され、このライトガイド２５の後端側はライトガイドケーブル４４内を挿通され、コネクタ４５を光源装置２４に接続することにより、レーザ２２からのレーザ光が端面に供給され、このレーザ光は伝送されて挿入部４１の先端側の端面からさらに拡散する照明レンズ４６を経て対向する組織４７側に励起光としてのレーザ光を照射する。

[0028]
A light guide 25 is passed through in an insertion part 41.
The rear-end side of this light guide 25 is passed through in the inside of the light-guide cable 44.
By connecting a connector 45 to a light source device 24, the laser light from a laser 22 is supplied to an end face.
This laser light is transmitted and irradiates the laser light as excitation light to the opposing tissue 47 side through the illumination lens 46 furthermore the end-face from at the side of the end of an insertion part 41 to diffuse.

【００２９】
この照明レンズ４６が取り付けられた照明窓に隣接して観察窓が設けてあり、この観察窓には対物レンズ４８が取り付けてあり、レーザ光が照射された組織４７側の像を結像位置に結ぶ。この結像位置にはイメージガイド２６の先端面が配置され、この像は伝送されて接眼部４３側の後端面に伝送される。この後端面に対向して接眼部４３内に接眼レンズ４９が配置されている。この接眼部４３には着脱自在のカメラ２８を到着することができる。

[0029]
It is adjacent to the illumination window in which this illumination lens 46 was attached, and the observation port is provided.
The objective lens 48 is attached in this observation port.
It is the bind the image at the side of the tissue 47 by which the laser light was irradiated, to an image-formation position.
The end surface of the image guide 26 is arranged on this image-formation position.
This image is transmitted and is transmitted to the rear-end surface at the side of the eye-piece part 43.
This rear-end surface is opposed and the eyepiece 49 is arranged in the eye-piece part 43.
This eye-piece part 43 can be reached in the detachable camera 28.

【００３０】

[0030]

このカメラ２８内には、前記接眼レンズ４９に対向して配置され、蛍光を励起する励起光を遮断する励起光カットフィルタ５０と、この励起光カットフィルタ５０を通して結像させるためのレンズ５１と、蛍光の特定波長を通過する複数のフィルタ５２ａ（図２では光路中に配置された状態の１つのフィルタ５２ａのみ示す）を設けた回転フィルタ５２と、この回転フィルタ５２の複数のフィルタ５２ａを光路中に配置するように切換えるために、回転フィルタ５２を回転させるモータ５３と、光路中のフィルタ５２ａを通った蛍光を増倍するイメージインテンシファイヤ５４と、このイメージインテンシファイヤ５４で増倍された蛍光による像を電気的なビデオ信号に変換するＣＣＤ５５とを有する。

In this camera 28, the above-mentioned eyepiece 49 is arranged oppositely facing.
The excitation-light cut filter 50 which interrupts the excitation light which excite a fluorescence, the lens 51 for making this excitation-light cut filter 50 pass through and project the image, the rotation filter 52 which provided several filter 52a (Fig. 2 shows only the one filter 52 a of the condition of having arranged in the optical path) which bypasses a fluorescent specific wavelength, the motor 53 which makes the rotation filter 52 rotate in order to switch so that several filter 52a of this rotation filter 52 may be arranged in an optical path, With the multiplier image intensifier 54 to perform, it is the fluorescence which passed along filter 52a in an optical path. It has CCD 55 which converts the image by the performed multiplier fluorescence into an electric video signal by this image intensifier 54.

【００３１】
前記処理装置２９は前記モータ５３を駆動コントロールし、フィルタ５２ａを切換えるタイミングローラ５６と、前記ＣＣＤ５５の信号を処理し、病変部を見やすくする画像処理を行う画像処理装置５７とより構成される。この画像処理装置５７はオリエンテーション時、つまりＬＤ２３を点灯させた場合には回転フィルタ５２を通してＣＣＤ

[0031]
The above-mentioned processing apparatus 29 performs the drive control of the above-mentioned motor 53.
The timing roller 56 which switches filter 52a, and the above-mentioned signal of CCD 55 are processed.
It consists of the image processor 57 which performs the image processing which makes a disease part legible.
At the time of an orientation, this image processor 57 also performs the signal

５５により撮像された像を色成分画像として擬似カラーで表示する信号処理も行う。

processing which displays the image which passes through the rotation filter 52 and was picked up by CCD 55, in a imitation colour as a colour component image, when making LD 23 light in other words.

【００３２】

なお、ＬＤ２３による発光は観察位置の確認、位置付けなどのオリエンテーション時に術者の操作で行うことができる。より具体的にはスイッチなどの操作により、励起光に対し、独立にＯＮ，ＯＦＦ（点灯，消灯）できる。

[0032]

In addition, the light emission by LD 23 can be performed by operation of an operator at the time of orientations, such as a confirmation of an observation position, and positioning.

By operation of a switch etc., it can more specifically turn on and off independently to excitation light (lighting, light extinguishing).

【００３３】

また、このＬＤ２３の光は回転フィルタ５２に組み込まれているフィルタ５２ａで抽出される特定の蛍光の波長（例えば緑と赤の波長）と一致している。さらにその光の照度は低く、レーザ２２により蛍光観察時における典型的な使用状態で、回転フィルタ５２に組み込まれているフィルタ５２ａを透過する特定の蛍光の強度とほぼ等しい反射光が、オリエンテーション時にフィルタ５２ａに入射される程度の低照度の光源である。

[0033]

Moreover, this light of LD 23 is congruous with the specific fluorescent wavelength (for example, green and red wavelength) extracted by filter 52a included in the rotation filter 52.

Furthermore the illuminance of that light is low.

Reflected light almost equal to specific fluorescent strength which performs the transmission of the filter 52a which is a typical service condition at the time of a fluorescent observation, and is included in the rotation filter 52 with the laser 22 is the light source of the low illuminance of the degree by which incidence is performed to filter 52a at the time of an orientation.

【００３４】

次に作用を説明する。蛍光観察時はレーザ２２より励起光とな

[0034]

Next an effect is explained.

Lenses 33, 34, and 35 are passed through at

る波長のレーザ光をレンズ３３，３４，３５を通し内視鏡２７のライトガイド２５に入射し、拡散する照明レンズ４６により体腔３８内の照明レンズ４６前方に拡散、照射する。この時、組織４７側からは蛍光が発生し、これを対物レンズ４８、イメージガイド２６、接眼レンズ４９を経て、カメラ２８に入射される。

the time of a fluorescent observation, and it performs incidence of the laser light of a wavelength which forms excitation light from a laser 22 to the light guide 25 of an endoscope 27.

It diffuses and irradiates in front of the illumination lens 46 in a body cavity 38 with the illumination lens 46 to diffuse.

At this time, a fluorescence occurs from a tissue 47 side.

It goes through an objective lens 48, the image guide 26, and the eyepiece 49, and incidence of this is performed to a camera 28.

【００３５】

つまり、カメラ２８内では励起光カットフィルタ５０により蛍光のみを通し、回転フィルタ５２に組み込まれたフィルタ（例えば緑色、または赤色のフィルタ）５２ａで特定の蛍光を抽出し、これをイメージインテンシファイヤ５４で約数千～数万倍に増幅した後、ＣＣＤカメラ５５で受ける。この時、回転フィルタ５２をモータ５３により回転フィルタ５２に組み込まれたフィルタ５２ａを切換え、各々のフィルタ５２ａで得られたビデオ信号を画像処理装置５７で病変部が強調される様に各々の信号の重み付け等の処理を行い、カラーモニタ３０で例えば擬似カラーで表示する。

[0035]

In other words, within a camera 28, fluorescent only is passed through with the excitation-light cut filter 50.

A specific fluorescence is extracted by filter (for example, filter of green or red colour) 52a included in the rotation filter 52.

After amplifying this to about several thousand - several tens of thousands increments by the image intensifier 54, the CCD camera 55 receives.

At this time, filter 52a included in the rotation filter 52 by the motor 53 in the rotation filter 52 is switched.

The weighting degree of each signal processes the video signal obtained by each filter 52a so that a disease part may be emphasised by the image processor 57.

It displays, for example, in a imitation colour with the colour monitor 30.

【００３６】

[0036]

一方、オリエンテーション時は、前記回転フィルタ５２に組み込まれたフィルタ５２ａの透過強度と等しい波長で発光するＬＤ２３を、コントローラ３２とドライバ３１で点灯させ、ダイクロイックミラー３７で反射させ、前記レーザ２２の光と合成する。

On the one side, the time of an orientation makes LD 23 which emits light on a wavelength equal to transmission strength of filter 52a included in the above-mentioned rotation filter 52 light by the controller 32 and the driver 31.

It is made to reflect by the dichroic mirror 37.

It synthesises with the light of the above-mentioned laser 22.

【００３７】

これらの光は前述と同様に、内視鏡２７に導光され、その反射光を、対物レンズ４８、イメージガイド２６で受ける。ＬＤ２３の波長は励起光カットフィルタ５０、回転フィルタ５２を通過するのでＬＤ２３に照射された像は反射光像としてイメージインテンシファイヤ５４で増倍され、ＣＣＤ５５で受光される。そして、反射光による画像で体腔内の様子が擬似カラーでカラーモニタ３０に表示されるので、その画像を観察することによりオリエンテーションがつけやすくなる。

[0037]

The light-guide of these lights are performed to an endoscope 27 as the above-mentioned.

That reflected light is received in an objective lens 48 and the image guide 26.

Because the wavelength of LD 23 bypasses the excitation-light cut filter 50 and the rotation filter 52, the image irradiated by LD 23 is multiplied by the image intensifier 54 as a reflected-light image.

It receives by CCD 55.

And, the situation of an intra-corporeal is displayed by the colour monitor 30 in a imitation colour by the image by reflected light. Therefore, it becomes easy to do an orientation by observing that image.

【００３８】

従って、この実施例は以下の効果を有する。蛍光観察時、空間が広くなったり、出血したりして蛍光像が暗くなった時、ＬＤの様な低照度の光源で照射することで、イメージインテンシファイヤへの焼付けなく、体腔内

[0038]

Therefore, this example has the following effects.

Space becomes large at the time of a fluorescent observation.

Moreover, when bleeding occurs and a fluorescent image becomes dark, by irradiating with the light source of the low illuminance like

を観察でき、オリエンテーションがつけやすくなる。なお、ＬＤ２３の代わりにＬＥＤを用いても良い。

LD, there is no baking to an image intensifier and an intra-corporeal can be observed.

It becomes easy to do an orientation.

In addition, LED may be used instead of LD 23.

【００３９】

図２の実施例の変形例を図３及び図４にそれぞれに示す。図３及び図４の変形例はレーザ２２の波長を青色領域の光として、ＬＤ４８，５２を緑と赤色領域の光として体腔内に照射し、それら反射光をＲＧＢのビデオ信号として検出することで、通常の白色光に近い観察を可能とするのもで、図３は光源装置２４′の構成を示し、図４はカメラ２８′の構成を示す。

[0039]

The modification of the example of Fig. 2 is shown in Fig. 3 and 4 at each.

The modification of Fig. 3 and 4 is the wavelength of a laser 22 as a light of a blue area. LD 48 and 52 is irradiated to an intra-corporeal as a light of green and a red-colour area.

By detecting these reflected light as a video signal of RGB, it is also enabling the observation near usual white light, and Fig. 3 shows the component of light-source-device 24'.

Fig. 4 shows the component of camera 28'.

【００４０】

図３に示す光源装置２４′は図２の光源装置２４において、ＬＤ２３の代わりに緑色領域の光を発生するＬＤ５８を用い、さらにレンズ３６とダイクロイックミラー３７との間に、赤色領域の光は反射し、それ以外は透過するダイクロイックミラー５９を配置し、このダイクロイックミラー５９に対向して赤色領域の光を発生するＬＤ６０及びレンズ６１を配置した構成にしている。ＬＤ５８と６０はドライバ３１により駆動され、共に

[0040]

The light of a red-colour area is further reflected between a lens 36 and the dichroic mirror 37 using LD 58 in which light-source-device 24' shown in Fig. 3 generates the light of a green area instead of LD 23 in the light source device 24 of Fig. 2.

Other than that arranges the dichroic mirror 59 which performs a transmission.

It is making the component which arranged LD 60 and the lens 61 which oppose this dichroic mirror 59 and generate the light of a red-colour area.

LD 58 and 60 is driven by the driver 31.

Both the lights of a low illuminance are

低照度の光を発生する。

generated.

【００４１】

この変形例ではレーザ２２の波長を青色領域の光としたので、レンズ３４と３５との間に配置したダイクロイックミラー３７は青色光は透過し、それより波長の長い光は反射するものである。

[0041]

In this modification, because the wavelength of a laser 22 was made into the light of a blue area, the dichroic mirror 37 arranged among lenses 34 and 35 performs the transmission of the blue glow.

The light with a wavelength longer than that is reflected.

【００４２】

この構成ではＬＤ５８と６０の各光をレンズ３６及び６１とダイクロイックミラー５９による透過及び反射により合成し、ダイクロイックミラー３７でレーザ２２の光をレンズ３３、３４を経てさらに合成し、レンズ３５で集光してライトガイド２５に入射することができるようにしている。

[0042]

With this component, each light of LD 58 and 60 is synthesised by the transmission and the reflection by lenses 36 and 61 and the dichroic mirror 59.

The light of a laser 22 is further synthesised through lenses 33 and 34 by the dichroic mirror 37.

It condenses with a lens 35 and it enables it to perform incidence to a light guide 25.

【００４３】

また、コントローラ３２には、スイッチ３２ａが接続され、このスイッチ３２ａをＯＮとすることでコントローラ３２はＬＤ５８，６０を動作させる。つまり、スイッチ３２ａによりレーザ２２の光と独立にＬＤ５８，６０を動作／非動作を制御できる。その他の構成は図２の光源装置２４と同様である。

[0043]

Moreover, switch 32a is connected to a controller 32.

A controller 32 operates LD 58 and 60 by setting this switch 32a to ON.

In other words, independently of the light of a laser 22 by switch 32a, it is controllable of operation / non-operating of LD 58 and 60.

Other components are the same as that of the light source device 24 of Fig. 2.

【００４４】

[0044]

一方、図4に示すカメラ28′内には、前記レーザ22の青色領域波長は反射し、それ以上長い波長を透過させるダイクロイックミラー64と、このダイクロイックミラー64を透過した光をさらに、緑色は反射し、それ以上長い波長は透過させるダイクロイックミラー65と、前記青色領域の像をビデオ信号に変換するＣＣＤ６６と、前記緑色領域の像を増倍するイメージインテンシファイヤ６７と、それをビデオ信号に変換するＣＣＤ６８と、前記赤色領域の像を増倍するイメージインテンシファイヤ６９と、それをビデオ信号に変換するＣＣＤ７０とを有する。

On the one side, in camera 28' shown in Fig. 4, the blue area wavelength of the above-mentioned laser 22 is reflected.

Green reflects further the dichroic mirror 64 which performs the transmission of the wavelength longer than that, and the light which transmitted this dichroic mirror 64.

A wavelength longer than that is with the dichroic mirror 65 which performs a transmission. CCD 66 which converts the image of an above-mentioned blue area into a video signal, With the multiplier image intensifier 67 to perform, it is the image of an above-mentioned green area. CCD 68 which converts that into a video signal, With the multiplier image intensifier 69 to perform, it is the image of an above-mentioned red-colour area. It has CCD 70 which converts that into a video signal.

【００４５】

また、レンズ７１～７５は内視鏡２７からの像を、ＣＣＤ６６、イメージインテンシファイヤ６７，６９に投影するものである。またフィルタ７６，７７は、各々ＬＤ５８の波長を含み、緑色の領域の特定波長を透過するものと、ＬＤ６０の波長を含み、赤色の領域の特定波長を透過するものである。

[0045]

Moreover, lenses 71-75 project the image from an endoscope 27 on CCD 66 and the image intensifiers 67 and 69.

Moreover filters 76 and 77 perform the transmission of the specific wavelength of a red area including that which performs the transmission of the specific wavelength of a green area, and the wavelength of LD 60, including each wavelength of LD 58.

【００４６】

ＣＣＤ６６、６８、７０により光電変換された信号は画像処理装置５７に入力され、蛍光観察

[0046]

The signal by which the photoelectric conversion was performed as for CCD 66, 68, and 70 is input into an image processor 57.

時は病変部を識別し易い表示が行えるような画像処理を行い、オリエンテーション時はＣＣＤ６６、６８、７０の出力信号を色成分の画像信号と見なしてカラー画像化する信号処理を行い、カラーモニタ３０に表示する。

At the time of a fluorescent observation, the image processing which can perform the display which is simple to perform the identification of the disease part is performed.
The signal processing which considers that the output signal of CCD 66, 68, and 70 is the image signal of a colour component, and colour-images it is performed at the time of an orientation.
It displays to the colour monitor 30.

【００４７】
次に作用を説明する。蛍光観察時は図２とほぼ同様であるが、図２の実施例では回転フィルタにより緑と赤色の特定波長を得たのに対し、図３及び図４の変形例では、ダイクロイックミラー６５とフィルタ７６，７７により特定波長に分け、それぞれをイメージインテンシファイヤ６７（緑用）、６９（赤用）と、ＣＣＤ６８（緑用）、７０（赤用）で受ける。

[0047]
Next an effect is explained.
It is the same as that of Fig. 2 almost at the time of a fluorescent observation.
However, in the modification of Fig. 3 and 4, it divides into a specific wavelength with a dichroic mirror 65 and the filters 76 and 77 to having obtained the specific wavelength of green and red colour with the rotation filter in the example of Fig. 2.
Each is received by CCD 68 (for green), and 70 (for red) with the image intensifiers 67 (for green), and 69 (for red).

【００４８】
そして、例えばＣＣＤ６８と７０で受光したイメージ画像における同一の部位をそれぞれ比較し、病変部等の異常な部位の可能性が高い部位に対してはその部分の色を変え、その際、病変部の可能性が高いと判断される結果に応じて色の色彩或いは表示色を変更するなどして擬似カラーで表示する。例えば、正常

[0048]
And, the identical part in a light-receiving image is respectively compared, for example, by CCD 68 and 70.
The colour of that part is changed to the part with the high possibility of abnormal parts, such as a disease part.
In that case, it becomes as follows depending on the result of judging that a disease part has high possibility. It displays in the imitation colour of changing a colour or a display colour.

と判断した部位は白色で表示し、病変部の可能性があるとある確率で判断される部位に対しては赤或いは緑色を付け、その確率が高い場合ほど彩度を上げて表示するなどして病変部の可能性がある部分を見やすく表示する。

For example, the part judged to be normal is white and is displayed.
Red or green is put to the part judged by a certain probability with the possibility of a disease part.

The part in which the case where that probability is higher performs raising and displaying a chroma etc., and has the possibility of a disease part to which is displayed legible.

【００４９】
一方、オリエンテーション時は、ユーザはスイッチ３２ａをＯＮしてコントローラ３２の指示により、ドライバ３１でＬＤ５８，６０を発光させる。

[0049]
On the one side, a user turns on switch 32a and makes LD 58 and 60 emit light by the driver 31 by the indication of a controller 32 at the time of an orientation.

【００５０】
そしてＬＤ５８，６０の光をレーザ２２の光と合わせてライトガイド２５に入射し、体腔内の臓器等に照射する。この反射光をイメージガイド２６で受け、接眼レンズ４９やレンズ７１～７５及びダイクロイックミラー６４，６５及びフィルタ７６，７７により青色領域の像は、ＣＣＤ６６に投影され、緑色領域の像はイメージインテンシファイヤ６７で増倍され、ＣＣＤ６８に投影され、赤色領域の像はイメージインテンシファイヤ６９で増倍されＣＣＤ７０に投影される。これら各々で得られた像はＲＧＢ信号として画像処理回路５７で処理され、カラーモ

[0050]
And the light of LD 58 and 60 is combined with the light of a laser 22, and incidence is performed to a light guide 25.

It irradiates to the organ of an intra-corporeal etc.
This reflected light is received in the image guide 26.
The image of a blue area is projected by CCD 66 with an eyepiece 49, the lenses 71-75, the dichroic mirrors 64 and 65, and the filters 76 and 77.
The image of a green area is multiplied by the image intensifier 67.
CCD 68 projects.

The image of a red-colour area is multiplied by the image intensifier 69, and is projected by CCD 70.
The image obtained in these each are

ニタ３０にカラーで表示される。

processed as a RGB signal in the image-processing circuit 57.

The colour monitor 30 displays in a colour.

【００５１】

この場合の表示は通常の白色照明のもとでの撮像によるカラー表示したものと殆ど同様の条件となるので、白色照明のもとで観察した場合の色調で観察することができる。

[0051]

Because the display in this case is the thing which is based on the image pick-up by the basis of the usual white illumination and which performed the colour display, and almost similar conditions, it can be observed in the colour tone at the time of observing on the basis of the white illumination.

【００５２】

この変形例は以下の効果を有する。青、緑、赤の３原色を照射受光することで白色光観察に近い色の判別ができるので、よりオリエンテーションが向上する。

[0052]

This modification has the following effects.

Because discrimination of the colour near a white-light observation can be performed by performing the irradiation light reception of blue and the green and red three primary colours, an orientation improves more.

【００５３】

次に本発明の第３実施例を説明する。この実施例は自家蛍光像と励起光による反射光源の両方を同時にモニタに示すことで、病変部と出血部、影等の違いを容易に判別可能にする蛍光診断装置である。まず、その背景を説明する。

[0053]

Next the 3rd example of this invention is explained.

This example is that both of sources of reflected light by the home fluorescence image and excitation light simultaneously shown in a monitor, and is fluorescent-diagnosis apparatus which enables simple discrimination of differences, such as a disease part, a bleeding part, and a shadow.

First, that background is explained.

【００５４】

従来では蛍光観察時には自家蛍光のスペクトルの緑と赤の領域

[0054]

Conventionally, at the time of a fluorescent observation, a photograph of the image of the

の波長の画像を撮影し、画像間で処理表示していた。また、特公平３－５８７２９号公報の従来例では、励起画像で蛍光画像を規格するのもを開示している。

green of the spectrum of a home fluorescence and the wavelength of a red area is taken.

The process display was performed between images.

Moreover, in the prior art example of the Japanese-Patent-Publication-gazette No. 3-58729, that which performs the specification of the fluorescent image by the excitation image is disclosed.

【００５５】
蛍光観察時、病変部、出血部、影が正常部に対し暗くなり、それらの区別が難しい。一方、蛍光の色々な変動を補正する方法として反射光源で蛍光像を規格化する方法が提案されているが、反射光源において病変部は明るいが、出血部、影は依然として暗くなる。

[0055]
A disease part, a bleeding part, and a shadow become dark to a normal part at the time of a fluorescent observation.

Those distinctions are difficult.

The method of considering as the method of performing the correction of fluorescent various fluctuations on the one side, and normalising a fluorescent image in the source of reflected light is proposed.

However, in the source of reflected light, although a disease part is bright, a bleeding part and a shadow become still dark.

【００５６】
この状態で規格化した場合、出血部と影の部分は暗い像で規格化することとなり、その部位はノイズの多い画質の悪いものとなる。

[0056]
When normalising in this condition, the part of a bleeding part and a shadow will be normalised by the dark image.

That part becomes that which of the image quality with many noises bad.

【００５７】
そこで、本実施例では病変部と出血部及び影との区別が容易に可能となる蛍光診断装置を提供することを目的として、この目

[0057]
Consequently, in order to attain this objective for the purpose of offering the fluorescent-diagnosis apparatus which can perform easily the distinction with a disease part, a bleeding

的を達成するために蛍光像と、反射光像の両方を２つの画像として同一モニタ上に表示することで、病変部と出血部及び影との区別が容易に可能となる構成にしている。以下に図５を参照して具体的に説明する。

part, and a shadow, in this example, the distinction with a disease part, a bleeding part, and a shadow is making both a fluorescent image and a reflected-light image to the component which can do easily, by displaying on an identical monitor as 2 images.

With reference to Fig. 5, it explains concretely below.

【００５８】

図５に示す蛍光診断装置８１は、レーザ２２を内蔵した光源装置８２と、この光源装置８２から出射した励起光を導光して体腔内の対象とする組織側に照射するライトガイド２５及び組織からの自家蛍光及び反射光像を伝送するイメージガイド２６とを内蔵した内視鏡２７と、前記自家蛍光像を撮像するイメージインテンシファイヤ６７，６９、ＣＣＤ６８，７０及び前記反射光像を撮像するＣＣＤ６６と、その光学系（レンズ７１～７５、ダイクロイックミラー６４，６５、フィルタ７６，７７）が、内蔵されたカメラ８３と、自家蛍光像に対応するビデオ信号を生成する処理する画像処理装置５７と、反射光象用ＣＣＤ６６を駆動し、反射光象に対応するビデオ信号を生成するＣＣＵ８４と、前記２つのビデオ信号をスーパーインポーズするスーパーインポーズ回路８５と、スーパーインポーズ回路８５を

[0058]

The fluorescent-diagnosis apparatus 81 shown in Fig. 5 is with the light source device 82 which built in the laser 22. The endoscope 27 which built in the image guide 26 which transmits the home fluorescence and the reflected-light image from the light guide 25 which irradiates to the tissue side which the light-guide of the excitation light which radiated from this light source device 82 is performed, and is made into the object of an intra-corporeal, and a tissue, CD which picks up the image intensifiers 67 and 69 which pick up an above-mentioned home fluorescence image, CCD 68 and 70, and an above-mentioned reflected-light image, that optical system (lenses 71-75, the dichroic mirrors 64 and 65, filters 76 and 77) drives CCD for reflected-light images 66 with the built camera 83 and the image processor 57 which generates the video signal corresponding to a home fluorescence image and to process.

It consists of CCU 84 which generates the video signal corresponding to a reflected-light elephant, the superimpose circuit 85 which superimposes the above-mentioned 2 video signals, and the monitor 30 which displays the home fluorescence image 86 and the reflected-

通したビデオ信号により自家蛍光像８６と反射光像８７を表示画面に並べて表示するモニタ３０とから構成される。

light image 87 side by side on a display screen by the video signal which passed through the superimpose circuit 85.

【００５９】

次にこの実施例の作用を説明する。まず、光源装置８２により励起光を内視鏡２７のライトガイド２５を通じ照射し、組織からの自家蛍光及び反射光をイメージガイド２６を通じカメラ８３で検出する。この時、励起光の反射光はＣＣＤ６６で撮影し、自家蛍光の緑及び赤の特定波長をイメージインテンシファイヤ６７，６９、ＣＣＤ６８，７０で撮影する。そして、反射光像と蛍光像は各々ビデオ信号に変換した後、スーパーインポーズ回路８５で合成され、モニタ３０上に並べて表示される。

[0059]

Next an effect of this example is explained.

First, excitation light are irradiated through the light guide 25 of an endoscope 27 by the light source device 82.

A camera 83 detects the home fluorescence and the reflected light from a tissue through the image guide 26.

At this time, a photograph of the reflected light of excitation light is taken by CD.

A photograph of the green and the red specific wavelength of a home fluorescence is taken by the image intensifiers 67 and 69 and CCD 68 and 70.

And, after converting a reflected-light image and a fluorescent image into each video signal, they are synthesised in the superimpose circuit 85.

It arranges and displays on a monitor 30.

【００６０】

この実施例によれば以下の効果がある。蛍光像において病変部及び出血部及び影は暗い像として検出されるため、その区別が難しかった。しかしながら、反射光像においては病変部は、正常部同様明るい反射像となり、それに対し出血部、影は暗くなる。したがって、蛍光像及び反射像の両方の画像を同時にモニ

[0060]

According to this example, there are the following effects.

Since a disease part, a bleeding part, and a shadow were detected as a dark image in a fluorescent image, that distinction was difficult.

However, as for a disease part, in a reflected-light image, a normal part is a bright reflecting image similar.

A bleeding part and a shadow become dark to that.

タで表示することで容易に判別がつきやすい。また、反射光像化では生検鉗子が見やすいので、精度の高い生検も可能になると考えられる。

Therefore, it is easy to do discrimination by displaying simultaneously the image of both fluorescent image and reflecting image with a monitor easily.

Moreover, by reflected-light imaging, because a biopsy forceps is legible, it is considered that an accurate biopsy is also made.

【００６１】

なお、例えば図２の内視鏡２７はファイババンドルを用いてイメージガイド２６を形成しているが、リレー光学系によりイメージガイド或いは光学像伝送手段を形成した内視鏡の場合にも適用できる。なお、上述した各実施例等を部分的等で組み合わせて異なる実施例等を構成しても良く、それらの実施例等も本発明に属する。

[0061]

In addition, the endoscope 27 of Fig. 2 is forming the image guide 26 using the fibre bundle, for example.

However, also in the case of the endoscope which formed an image guide or optical image transmission means with the relay optical system, it is applicable.

In addition, the example which combines each performed above-mentioned example in a partial degree, and is different may be comprised.

Those examples etc. belong to this invention.

【００６２】

[0062]

【付記】

２．組織蛍光を発生させるための励起光を発生する光源と、組織からの蛍光を２次元画像として検出するイメージガイドを持った内視鏡と、前記内視鏡と接続し、２次元画像の蛍光像のうち少なくとも１つの特定波長の蛍光像を撮像する撮像手段を持ったカメラとからなる蛍光診断装置において、前記光源に、前

[Additional remark]

2. Connect with the light source which generates the excitation light for generating the histofluorescence, the endoscope with the image guide which detects the fluorescence from a tissue as a two-dimensional image, and an above-mentioned endoscope.

In the fluorescent-diagnosis apparatus which consists of the camera with image-pick-up means to pick up the fluorescent image of one specific wavelength at least among the

記少なくとも１つの特定波長の一部を含んだ波長の照明光を発生する低照度光源が組み込まれ、前記励起光と前記照明光を合成する合成手段と、前記照明光が励起光に対し独立にＯＮ，ＯＦＦできる制御装置とからなる蛍光診断装置。

fluorescent images of a two-dimensional image, the low illuminance light source which generates the illumination light of the above-mentioned wavelength which included at least a part of one specific wavelength, in an above-mentioned light source is included.

The fluorescent-diagnosis apparatus which consists of synthetic means to synthesise above-mentioned excitation light and an above-mentioned illumination light, and the control apparatus which an above-mentioned illumination light can turn on and off independently to excitation light.

【００６３】

３．前記低照度光源は緑と赤の波長を含む領域の波長であり、前記励起光は青の波長帯域に含まれる波長であり、前記撮像手段は前記青、緑、赤のそれぞれの波長に対応した画像を撮像する前記付記２記載の蛍光診断装置。

[0063]

3. An above-mentioned low illuminance light source is the wavelength of the area containing green and a red wavelength.

Above-mentioned excitation light are a wavelength included in a blue wavelength band.

Above-mentioned image-pick-up means is the fluorescent-diagnosis apparatus of the additional-remark 2 above-mentioned description which picks up the image corresponding to above-mentioned blue and each green and red wavelength.

【００６４】

４．前記低照度光源はＬＥＤまたはＬＤである前記付記２記載の蛍光診断装置。

５．前記合成手段は光の波長により反射透過するダイクロイックミラーである前記付記２記載の蛍光診断装置。

[0064]

4. An above-mentioned low illuminance light source is the fluorescent-diagnosis apparatus of the additional-remark 2 above-mentioned description which is LED or LD.

5. Above-mentioned synthetic means is the fluorescent-diagnosis apparatus of the additional-remark 2 above-mentioned description which is the dichroic mirror which

performs a reflecting transmission with the wavelength of a light.

【００６５】
６．前記励起光はＨｅ－Ｃｄレーザによる４４２ nm の光である前記付記２記載の蛍光診断装置。

[0065]
6. Above-mentioned excitation light are the fluorescent-diagnosis apparatus of the additional-remark 2 above-mentioned description which is a 442 nm light by the He-Cd laser.

【００６６】
７．組織蛍光を発生させるための励起光を発生する光源と、前記励起光を体腔内に照射し、組織からの蛍光を２次元画像として検出するイメージガイドを持った内視鏡と、前記内視鏡と接続し、２次元画像の蛍光像のうち少なくとも１つの特定波長の蛍光像を撮像する撮像手段を持ったカメラとからなる蛍光診断装置において、前記カメラ内に前記励起光による組織からの反射光を２次元画像として撮像する第２の撮像手段を加え持ち、前記蛍光像と前記反射光像の両方を同一画面上に合成するためのスーパーインポーズ手段と、それを表示する表示手段を持った蛍光診断装置。

[0066]
7. Irradiate the light source which generates the excitation light for generating the histofluorescence, and above-mentioned excitation light, to an intra-corporeal.
It connects with the endoscope with the image guide which detects the fluorescence from a tissue as a two-dimensional image, and an above-mentioned endoscope.
In the fluorescent-diagnosis apparatus which consists of the camera with image-pick-up means to pick up the fluorescent image of one specific wavelength at least among the fluorescent images of a two-dimensional image, it adds and has 2nd image-pick-up means to pick up reflected light from the tissue by above-mentioned excitation light as a two-dimensional image, in an above-mentioned camera.
The fluorescent-diagnosis apparatus with superimpose means for synthesising both above-mentioned fluorescent image and above-mentioned reflected-light image on an identical screen, and display means to display that.

【００６７】

[0067]

【発明の効果】
以上述べたように本発明によれば、体腔内臓器を観察する内視鏡のチャンネル内に挿通可能な細長の挿入部と、前記挿入部の先端に設けられた組織を採取するための開閉可能なカップと、挿入部の手元側に設けられた前記カップを開閉操作する操作部と、前記挿入部内に組み込まれ、前記カップの根本付近に光の出射端を配置され前記カップを開いた状態では、伝送した励起光を照射し、かつ対象組織側からの蛍光を取り込み可能とする光ファイバとを有する生検鉗子と；前記光ファイバへ励起光を入射する光源装置と；前記蛍光を前記光ファイバを通じ検出し、スペクトルに分解する分光器と；前記スペクトルを解析し、対象組織の性状を診断するための解析装置と；前記解析装置による解析情報を表示する表示装置と；から蛍光診断装置が構成されているので、生検しようとする部位を実際に生検する前に光ファイバの先端面から励起光を照射し、かつ蛍光を取り込んで病変部であるか否かをの蛍光診断ができ、その結果により病変部である可能性が高い場合に実際に生検を行うことができるので、病変部をより確実に生検

[EFFECT OF THE INVENTION]
It is included such as in the operating part which performs the opening-closing operation of the long and slender insertion part which can be passed through in the channel of the endoscope which was described above, and which observes an intra-corporeal organ according to this invention, the openable cup for extracting the tissue provided at the end of an above-mentioned insertion part, and the above-mentioned cup provided in the hand side of an insertion part, and an above-mentioned insertion part.

Where it arranges the radiation end of a light near the origin of an above-mentioned cup and an above-mentioned cup is opened, the transmitted excitation light are irradiated.

And biopsy forceps which has the optical fibre which makes it possible receiving of the fluorescence from an object tissue side; Light source device which performs incidence of the excitation light to an above-mentioned optical fibre; Spectrometer which an above-mentioned fluorescence is detected through an above-mentioned optical fibre, and is dissolved into a spectrum; Analysis apparatus for analysing an above-mentioned spectrum and diagnosing the characteristic of an object tissue; Display device which displays analysis information by above-mentioned analysis apparatus; Because the from fluorescent-diagnosis apparatus is comprised, before actually performing the biopsy of the part which is going to perform a biopsy, excitation light are irradiated from the

することができる。

end surface of an optical fibre.

And a fluorescence is received and fluorescent diagnosis can check whether it is a disease part.

Because a biopsy can actually be performed when possibility that it is a disease part more is high as a result, the biopsy of the disease part can be performed more reliably.

【図面の簡単な説明】

[BRIEF EXPLANATION OF DRAWINGS]

【図１】

本発明の第１実施例の蛍光診断装置の構成図。

[FIGURE 1]

The block diagram of the fluorescent-diagnosis apparatus of the 1st example of this invention.

【図２】

本発明の第２実施例の蛍光診断装置の構成図。

[FIGURE 2]

The block diagram of the fluorescent-diagnosis apparatus of the 2nd example of this invention.

【図３】

第２実施例の変形例における光源装置の構成図。

[FIGURE 3]

The block diagram of the light source device in the modification of the 2nd example.

【図４】

第２実施例の変形例におけるカメラの構成図。

[FIGURE 4]

The block diagram of the camera in the modification of the 2nd example.

【図５】

本発明の第３実施例の蛍光診断装置の構成図。

[FIGURE 5]

The block diagram of the fluorescent-diagnosis apparatus of the 3rd example of this invention.

【符号の説明】

１…蛍光診断装置

２…光診断機能付生検鉗子

３…光ファイバ

３Ａ…先端面

[EXPLANATION OF DRAWING]

1... Fluorescent-Diagnosis Apparatus

2... Biopsy Forceps with Optical Diagnostic Function

3... Optical Fibre

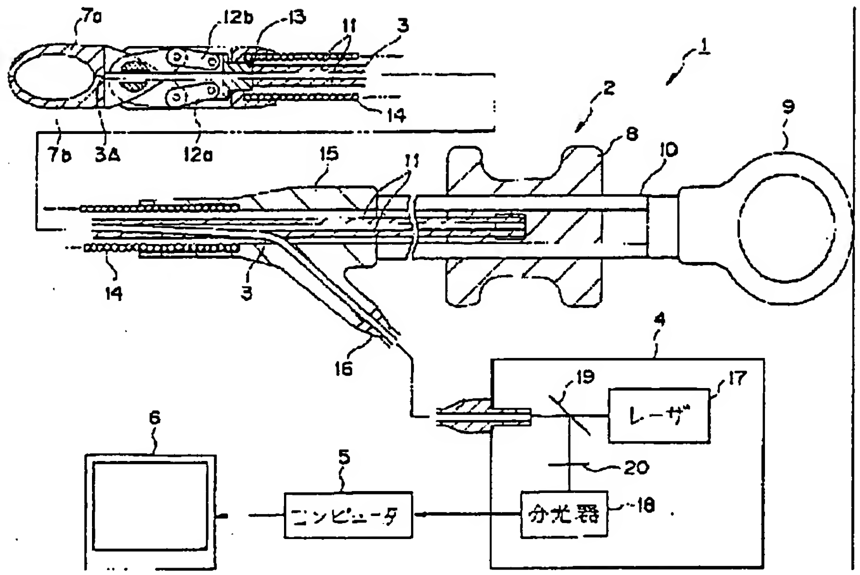
4…分析装置
5…コンピュータ
6…カラーモニタ
7ａ，７ｂ…カップ
8…操作スライダ
9…指掛
１０…操作部材
１１…操作ワイヤ
１２ａ，１２ｂ…リンク
１３…継ぎ部
１４…コイルシース
１５…シース固定部材
１６…中継ケーブル
１７…レーザ
１８…分光器
１９…ダイクロイックミラー
２０…フィルタ
２１…蛍光診断装置
２３…ＬＤ
２５…ライトガイド
２６…イメージガイド
２７…内視鏡
２８…カメラ
２９…処理装置
３０…カラーモニタ
５７…画像処理装置

3A... End surface
4... Analyser
5... Computer
6... Colour Monitor
7a and 7b... Cup
8... Operation Slider
9... Finger Hook
10... Operational Member
11... Operation Wire
12a and 12b... Link
13... Splice Part
14... Coil Sheath
15... Sheath Fixing Member
16... Trunk Cable
17... Laser
18... Spectrometer
19... Dichroic Mirror
20... Filter
21... Fluorescent-Diagnosis Apparatus
23... LD
25... Light Guide
26... Image Guide
27... Endoscope
28... Camera
29... Processing Apparatus
30... Colour Monitor
57... Image Processor

【図１】

[FIGURE 1]

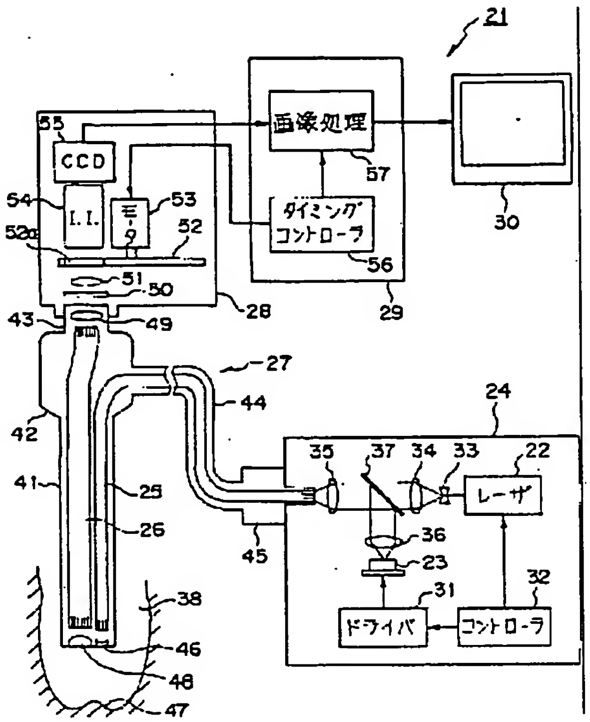
5 Computer	18 Spectrometer	17 Laser



【図２】

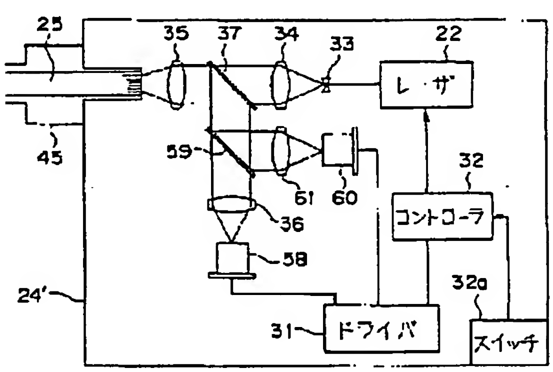
[FIGURE 2]

53 ... Motor	57... Image Processor	56 ... Timing Controller
22 ... Laser	31 ... Driver	32 ... Controller



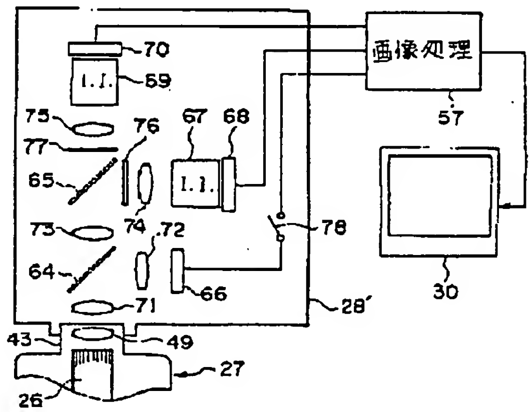
【図3】 [FIGURE 3]

22 ... Laser	32 ... Controller
31 ... Driver	32a ... Switch



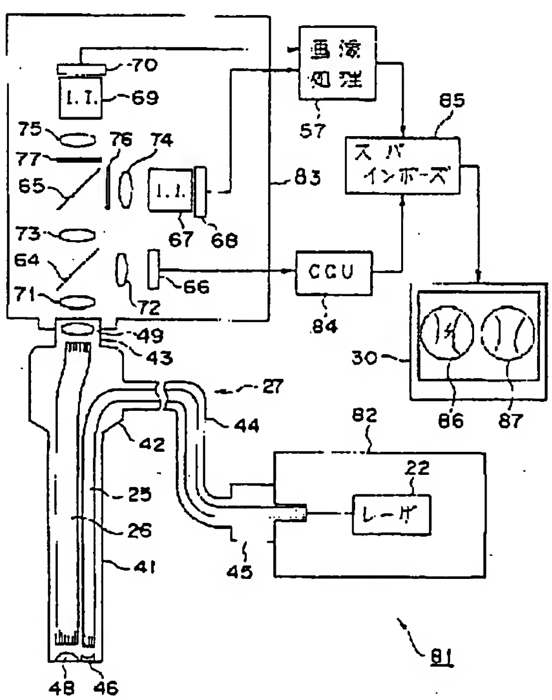
【図4】 [FIGURE 4]

Image Processor



【図5】 **[FIGURE 5]**

57 ... Image Processor
85 ... Superimpose
22 ... Laser



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